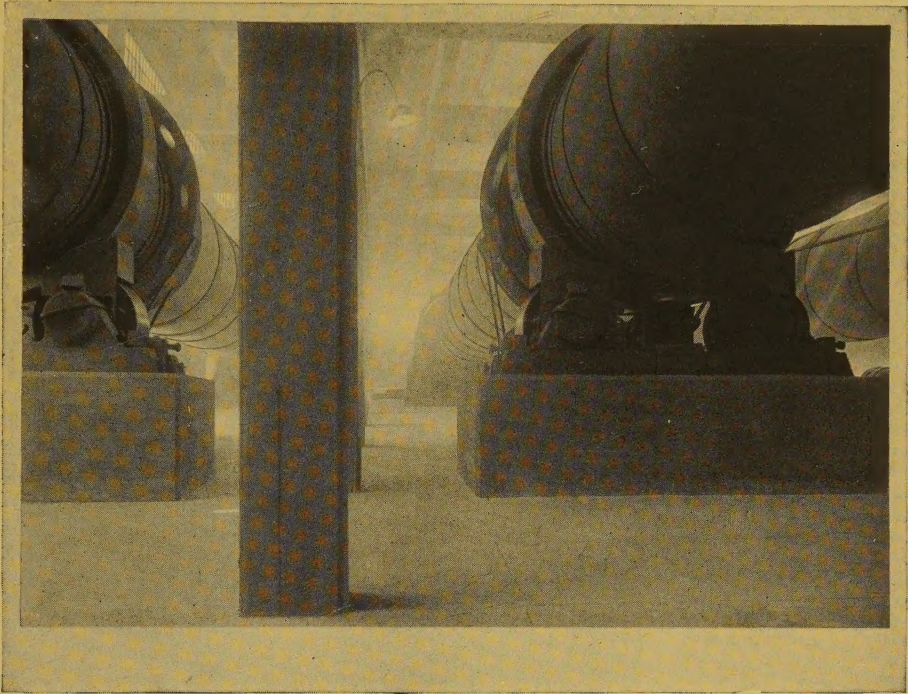


MILL SECTION of
Concrete

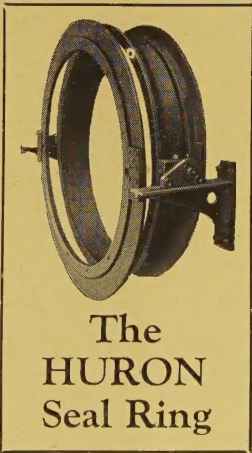


SAVE HEAT
where heat is needed!

Huron Seal Rings increase operating efficiency by maintaining a perfect and constant seal on any kiln, dryer or cooler in which it is desirable to retain heat or gases or from which drafts are to be excluded.

They seal by gravity—there are no springs to weaken. They require no lubrication, no repairs. The first one installed, six years ago, is still running and hasn't been touched in that time.

On kilns and dryers, heat



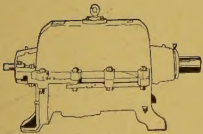
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When applied to the discharge end of rotary kilns, Huron Rings make control of the burning easier.

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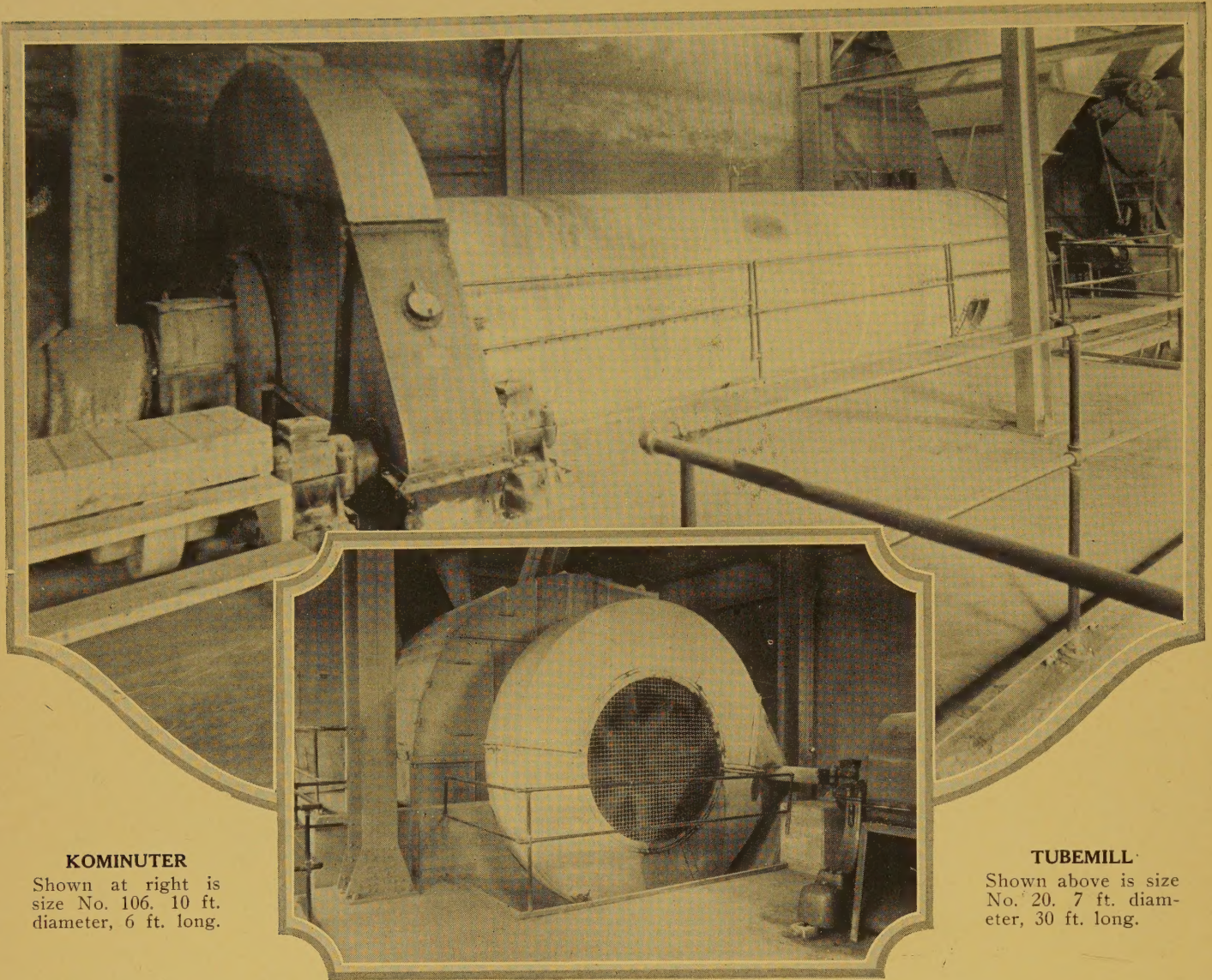
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—are designed and built to meet the rigid requirements of the rock products industries. Special features include built in thrust bearings and self contained oil pump. Write for our reducer catalog.

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HURON Seal Rings
for ROTARY KILNS-DRYERS-COOLERS

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**KOMINUTER**

Shown at right is size No. 106. 10 ft. diameter, 6 ft. long.

TUBEMILL

Shown above is size No. 20. 7 ft. diameter, 30 ft. long.

Large Dry Units

DRY KOMINUTER AND TUBEMILL BATTERIES combine flexibility of operation, uniform fineness of product, large capacity per horsepower, and low operating costs.

The Dry Kominuter takes cement clinker, without preliminary crushing, or dry raw materials direct from crusher or hammer mill, and delivers a product correctly sized with strict uniformity, for tubemill feed.

The Dry Tubemill grinding cement clinker takes the Kominuter product and delivers a finished cement of uniform fineness, free from coarse particles.

For general pulverizing work the tubemill is a consistent producer of uniformly ground materials.

F. L. Smidth & Co.

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ENGINEERS

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Designers and Equippers of
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Factory, Foundry and Laboratory—Elizabeth, N. J.

NEW YORK

MILL SECTION of Concrete

The Cement Mill Edition of Concrete is edited exclusively for those interested in the manufacture of cement. Its pages are devoted to discussions of plant design, management, operation, production efficiency, chemical research and control, quarry operation, progress and news of the industry.

The Cement Mill Edition also contains all the material published in the corresponding Regular Edition and so provides news of the uses and merchandising of the materials whose manufacture is discussed in the Mill Edition. The Regular Section furnishes mill operating officials and mill executives valuable points of contact with the users of the materials they produce.

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July, 1928

Number 1

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THE WORLD WOULD STAND STILL FOR
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- But the World do Move

HERE IS a new development

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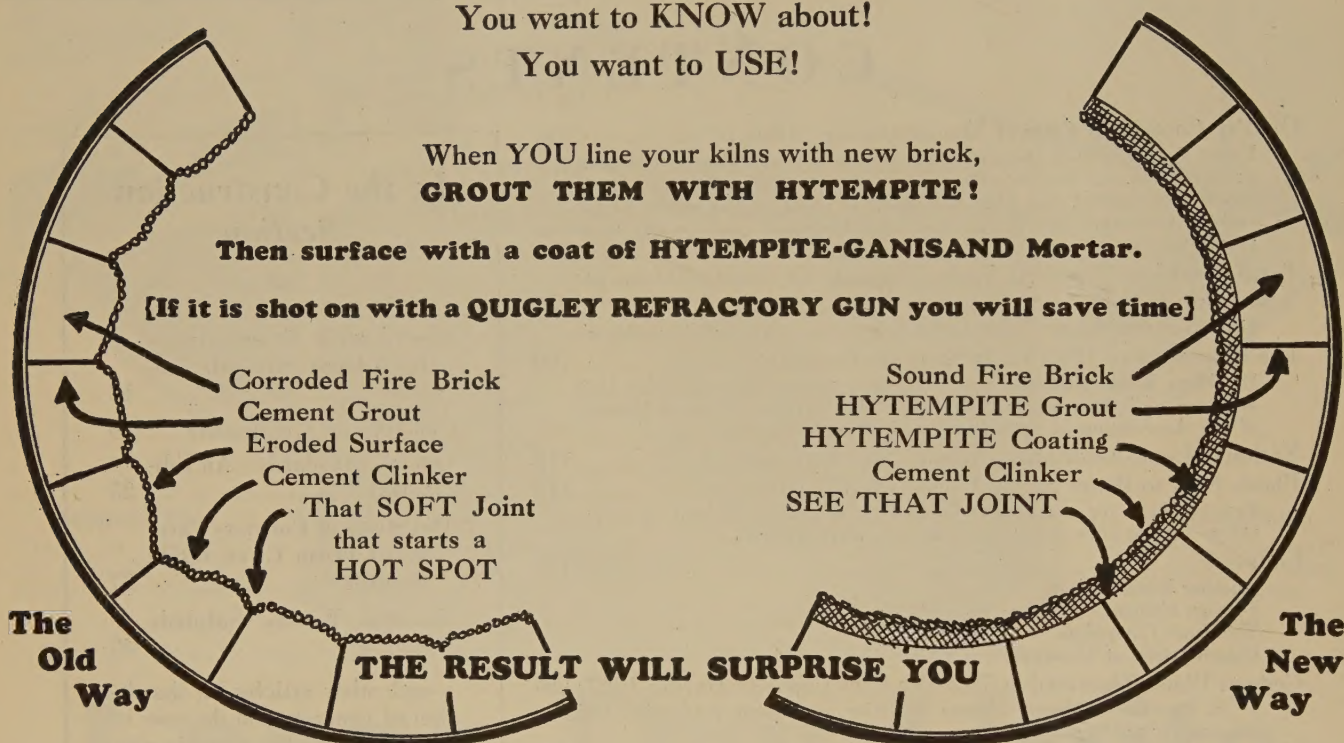
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When YOU line your kilns with new brick,
GROUT THEM WITH HYTEMPITE!

Then surface with a coat of **HYTEMPITE-GANISAND Mortar.**

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When the Incandescent Flame hits that **HYTEMPITE-GANISAND** Surface, this Coating **ATTRACTS** the Granules of Cement Clinker and causes them to **ADHERE** as in a matrix; then **VITRIFIES** and becomes **HARDER** than the Fire Brick itself.

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Call your "QUIGLEY SERVICE STATION"
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Quality Control in Cement Manufacturing

How Quality of Cement Is Controlled at the Plant of the Dewey Portland Cement Company at Davenport, Iowa—Factors Influencing Quality and Uniformity—Raw Materials and Chemical Control—Manufacturing Methods and Equipment Influence Quality—How These Requirements Are Met at the Dewey Plant

By EDGAR S. ERNST

Chief Chemist, Dewey Portland Cement Co., Davenport, Iowa

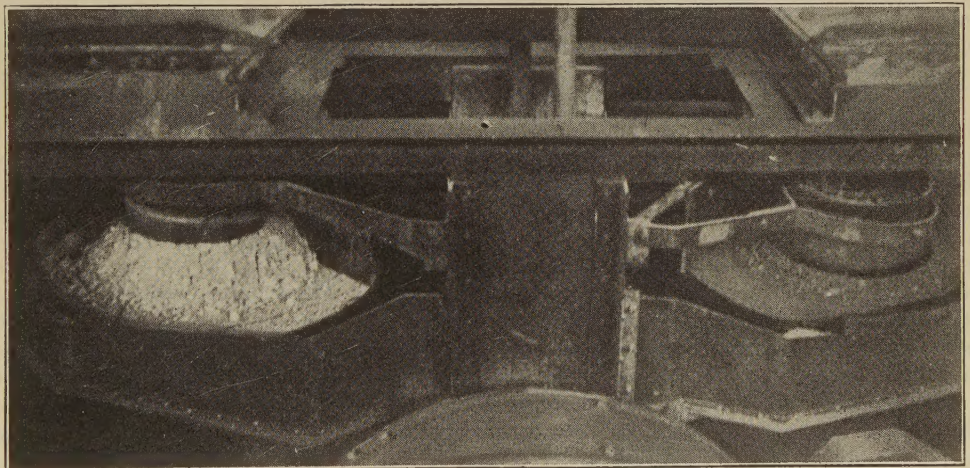
THE Dewey Portland Cement Company, in putting up its plant at Davenport, Iowa, desired to put out a product of outstanding quality. Great care was, therefore, exercised in the selection of the proper raw materials. But raw materials do not entirely determine the quality of the finished product even though they do have an im-

as quite essential to the production of a high quality and uniform product. From the very nature of cement, its chemical composition would naturally be among the first points to be considered. Much study and work has been done in an effort to ascertain the structural composition of cement and the action of the various constituents when

□ □ □

The table feeders on the raw mills. "High lime" rock is fed on the right, "low lime" rock on the left

□ □ □



portant bearing on it. So, in handling, preparing and processing the raw materials, every care was taken to conform to the latest and best practice in the industry. With prices and service fairly well standardized, it is quality that is receiving the attention of the consumer today.

There are several steps and conditions in the manufacture of portland cement which have come to be regarded

combined with water and aggregate in a concrete mix and, while investigators are not satisfied as yet, several points seem to be definitely established.

Most chemists agree that, other things being equal, the strength of a portland cement, especially in the early stages of hardening, depends in large measure on the percentage of tri-calcium silicate which it contains. Cements of almost identical analysis may be very different

in their structural makeup. Much depends on the physical treatment which they have undergone in their manufacture.

Effect of Physical Treatment on Quality

Considered from the standpoint of physical treatment alone, the quality of a cement may be said to depend, for the most part, on the fineness to which the raw materials are ground, the thoroughness and uniformity of mixing of the kiln feed, the hardness of burning of the clinker in the kiln and the fineness to which the finished cement is reduced. There are other important steps but those mentioned here are among the major ones.

The fineness of the raw materials plays a most important part. The finer they are ground, the more intimate the mixture which can be obtained between the argillaceous and the calcareous materials. This fine grinding and intimate mixing is desirable for several reasons. They greatly reduce the segregation which usually takes place in slurries which are coarsely ground, help to carry chemical combination nearer completion in the process of incipient fusion, which later takes place in the kiln. Due to the greater surface exposed to contact, it makes burning easier and results in a better product at less fuel expense. Hence a policy of grinding the raw materials as fine as practicable was adopted at this plant and has been rigidly adhered to. In order to accomplish this, a constant check is kept on the output of the mills by careful and frequent sampling, changes being made when necessary to correct for variations from the desired fineness. This practice of carefully checking operations is followed from the time that the raw materials leave the quarry, throughout the process, until the finished cement leaves the yards.

The next step which is recognized to be of much importance is the thorough blending, mixing and agitation of the slurry before being sent to the kilns for burning. The mixing is done in large concrete tanks, by the aid of Minogue mechanical-air agitators. When thoroughly mixed the contents of each tank are analyzed and mixed with that of some other tank which is suitable to bring the composition of the final blend to the desired figure. Checks are again made at intervals on the kiln feed to make certain that uniformity is being maintained.

The burning is in charge of skilled operators who, in addition to the usual visual means, control burning conditions by aid of a radiation pyrometer. Thorough burning with the complete chemical combination of the several constituents of the mix is recognized as being highly essential to the production of a high-grade, early strength cement, hence this phase of the operations is closely watched. Complete burning depends on the chemical composition of the mix, the fineness to which the raw materials have been ground, the temperature to which they have been subjected and the time which they remain in the burning zone of the kiln. At this plant, as the result of many experiments, a flame temperature between 2800 and 2900 deg. F. has been found to be most practical when fuel consumption, life of kiln linings, quality of clinker, etc., are all taken into consideration. At other plants, operating under different conditions and with other raw materials this figure would, no doubt, be subject to change.

Proper air cooling of the clinker has next been given attention. It has been found that the grindability of the clinker produced at this and other plants is greatly affected by the means employed in cooling it, rapid air cooling giving by far the best results. Rotary coolers are installed.

With the advent of the so-called high strength portland cements more and more attention has been paid to the fineness of grinding of the clinker. It is well known that clinker that is exposed to the elements in a stockpile is relatively inert and unaffected, but, when ground to a powder becomes quite reactive to water. It has also been found that the most active part of such a powder is that portion called "flour," or that which will pass the 200 or finer mesh sieves. With that fact in mind, the fineness of the finished cement has been maintained through close supervision, at a much higher point than that required by the standard specifications of the A. S. T. M. and others.

The cement produced at this plant is a normal portland cement in chemical composition but it is made under the conditions mentioned above which are recognized by modern practice as being essential to the production of a high quality product and they have tended to give it special qualities of excellence such as uniformly high fineness, normal setting time, rich, smooth working qualities and high early strength with an increase of strength with age.

Location

Davenport, Iowa, situated on the Mississippi River, across from the tri-cities of Rock Island, Moline and East Moline, Illinois, has long been considered a good location for a cement mill insofar as shipping facilities and a ready market for its product are concerned. In fact, several attempts have been made in the past to build plants in its vicinity but, for various reasons, none seemed successful until the Dewey Portland Cement Company took up the task. This company owned an excellent quarry and plant site near the little town of Buffalo, Iowa (but within the switching district of Davenport). For a number of years the Great War hindered it in carrying out its plans to build on this site but the company now has a modern wet-process plant erected there which has run at full capacity since being put into operation in June, 1927.

The quarry site was thoroughly prospected by drilling representative test holes and making complete analyses of the samples so obtained. These analyses indicated that a very high-grade, high early strength portland cement could be produced from the materials on the property. Results obtained under actual operating conditions have justified the most optimistic expectations since the cement produced has consistently exceeded the standard specifications by wide margins of excellence.

Raw Materials

Many have been under the impression that the limestones found in the Davenport district are unsuited to the manufacture of a high-grade portland cement due to the high magnesium carbonate content which they are reported to carry. In many places in and about the city such an impression would be based, more or less, on facts as will be shown below. Such is not the case, however, in the district in which the Dewey Portland Cement Company's quarry and plant are situated. Here the rock has been drilled in many places and found to be high-grade throughout, the average magnesium oxide for a depth of 90 ft. being under 2 per cent. When the fact that this stone makes up about 90 per cent of the raw mixture is taken into account it can be seen that no difficulty should be experienced in keeping the MgO content of the finished cement well within the limiting specification of 5 per cent.

Field investigations carried out by the geologists of the Iowa State Highway Commission have classified the de-

posits found in the Davenport district as shown in the following table:

System	Series	Stage	Formation
Mississippian	Des Moines	Coal Measures	
		Cedar Valley	Limestone
Devonian	Middle		Upper Davenport Limestone
	Devonian	Wapsipinicon	Lower Davenport Limestone
			Independence Shale
			Otis Limestone
Silurian	Niagara	Gower Dolomite	Anamosa Type
			Le Claire Type

“The Anamosa and Le Claire Types of the Gower Dolomite are believed to be practically contemporaneous, the Le Claire being deposited in the form of reefs upon the sea bottom and the Anamosa from accumulated sediments surrounding those reefs.

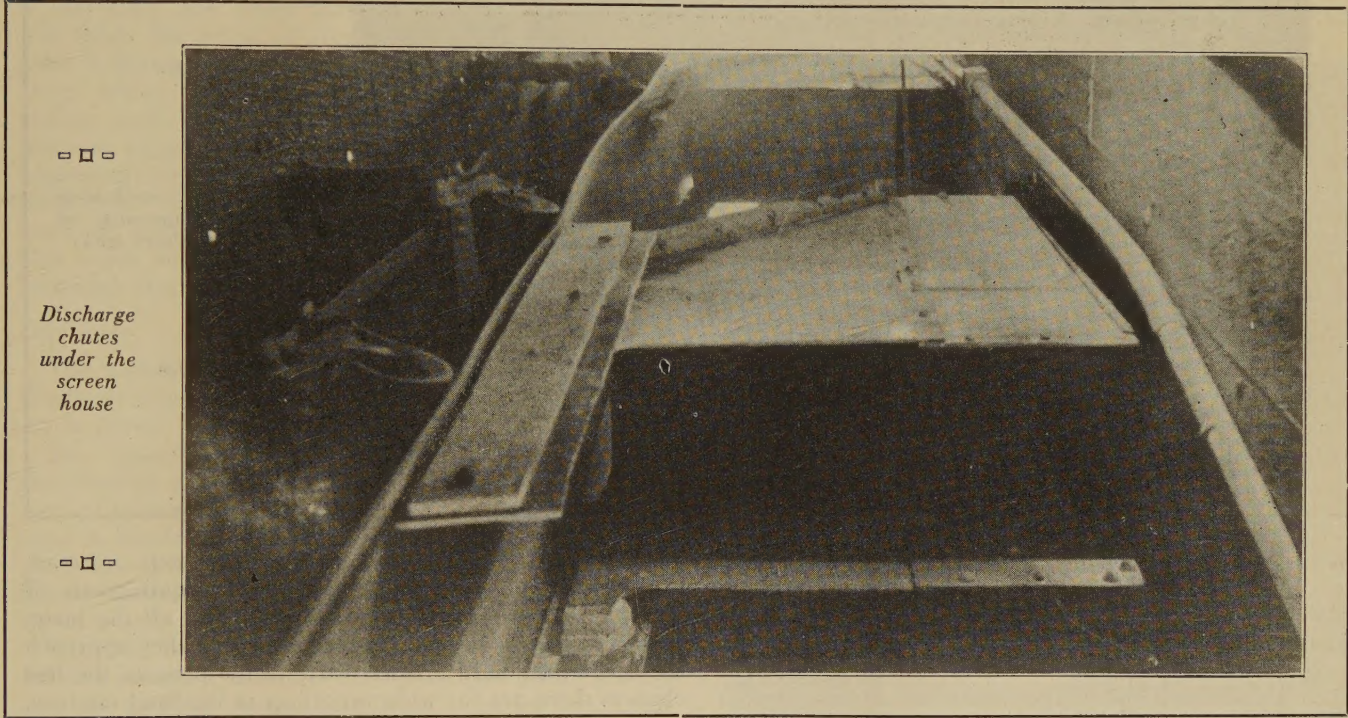
“The Anamosa is typically a gray to buff, granular-textured dolomite occurring in regular and even beds. A

exposed and affords an easy means of identification of this formation.

“The Anamosa and the Le Claire appear at the same level, often one beside the other in the same exposure, and in outcroppings where only the one is seen the presence of the other may be suspected. The full thickness of the Gower stage is not exactly known, being nowhere entirely exposed in this region, but is believed to be somewhere in the neighborhood of 100 ft.

“The Otis limestone is in Scott County relatively unimportant, as its area of outcrop is very small. It is a high-calcium limestone, light gray, hard and dense, and fine-grained. It lies in fairly regular and level beds. It is lithologically almost identical with the Lower Davenport limestone from which it may be distinguished only by its position with respect to the Independence shale or by the presence of one fossil form, a small brachiopod. The Lower Davenport is non-fossiliferous.

“The Independence shale lies conformably above the Otis limestone. It consists of beds of yellow, earthy lime-



most prominent characteristic is the presence of numerous horizontal planes of lamination, along any of which the rock may be split. Upon prolonged weathering, it parts at all of these planes and the resulting thin plates afford an easy means of identification of long-exposed faces. In hardness the rock is rather inferior, with a French co-efficient of 2 to 3.

“The Le Claire Type is much more variable than the Anamosa. As usually seen it is a crystalline, gray to buff dolomite with a porous or vesicular texture and an irregular fracture. The hardness is variable, tests for French co-efficient showing results from 3 to 10. The stratification is very erratic; at times the heavy beds run nearly level; again they are seen to dip steeply; and occasionally disappear entirely, a face of 30 ft. or more showing no structure whatever. Finally these three phases merge by imperceptible degrees into one another and even into types approaching the Anamosa. A common characteristic is the presence of small cavities, sometimes empty but more often filled with a brown, sandy residual clay. This gives a deeply pitted and cavernous appearance to ledges long

stone alternating with beds of yellow, drab or green fossiliferous shale.

“Above the Independence shale is the Lower Davenport limestone, easily recognized by its light gray, almost white, color and by its smooth, flinty fracture. The cracked and brecciated portions are also more in evidence than in the Otis, some beds being traversed by a network of small cracks filled with green shale.

“The Upper Davenport limestone may be distinguished from the Lower Davenport by its coarser crystalline texture, by its darker gray color and by the presence in it of numerous fossil forms. It is a hard, tough, and sound limestone in regular and usually heavy beds, and not separated by a distinct line, either from the Lower Davenport below or the Cedar Valley above.

“The beds of the Cedar Valley Stage are somewhat variable in nature. The lower part of the formation is exposed in Scott County. Next above the Upper Davenport limestone are some 50 ft. of a hard, dark gray, shaly limestone in heavy beds divided by numerous oblique joint planes. The rock has usually a rather dull or earthy tex-

ture, but some beds are hard and flint-like and in color almost white. The whole is very strongly fossiliferous, brachiopod shells and fragments of crinoid stems being most prominent.”*

Materials Used at Dewey Plant

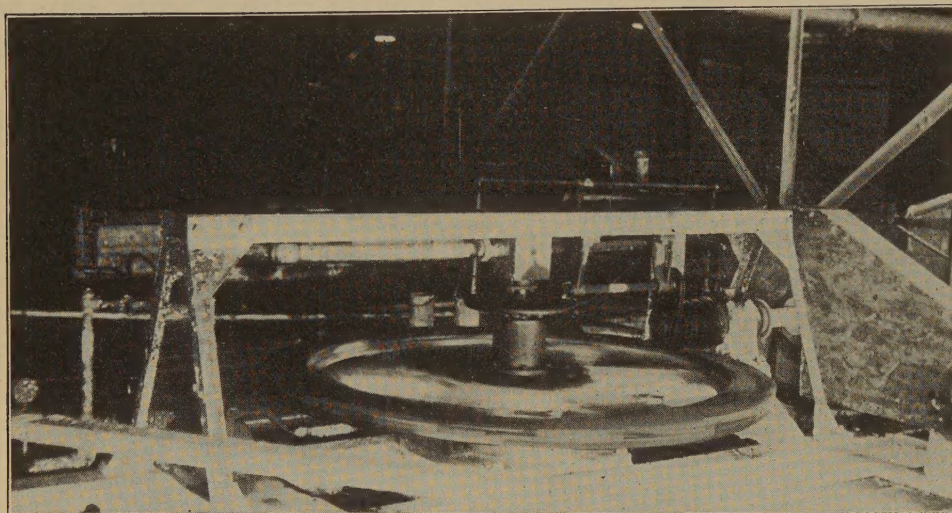
The deposits found in the quarry of the Dewey Portland Cement Company are the Cedar Valley, Upper Davenport and Lower Davenport together with some shales of the coal measures.

The Cedar Valley formation makes up the upper 40 ft. and is covered by a few feet of clayey overburden. Considered from the standpoint of a cement raw material it might be classed as a cement-rock in that it quite closely approaches that material in composition, having most of the necessary silica and aluminum and iron oxides present in approximately the proper ratio. Fortunately, however,

ported by belt conveyor to the screen house where it is separated into three sizes by means of a 72- by 28-ft. Galland-Henning rollerless screen.

This screen serves two purposes. In addition to classifying the materials as to size for commercial uses it makes a rather good separation of the low-limed and the high-limed material, all the clay and shale going in with the fines due to the difference in size which results from the greater hardness of the limestone as compared with the clay and shale. The bins containing the separated materials all discharge onto a common belt conveyor which takes the material to the mills or to storage. The amount discharged from any one bin at a time can be regulated by a slide in the discharge chute.

This system of blending, made possible by the separation and concentration mentioned above, permits a certain amount of regulation of the percentage of lime carried in



A Minogue mechanical agitator in operation on one of the slurry tanks

this ratio is lower than that desired in the finished product, making it possible and convenient to utilize the higher ratio clay found directly above it. The fact that this latter material can be so used results in the partial elimination of expensive stripping.

The Upper and Lower Davenport formations carry a higher calcium carbonate content than the Cedar Valley and, besides being good cement material, supply an excellent quality commercial stone. It was this fact that induced the Dewey Portland Cement Company when designing their plant to make provisions for the screening and loading of commercial stone. (It has recently entered this field and will soon be ready to supply any demand made upon it for road material of this nature.)

At the present time all of the limestone, shale and clay requirements of the plant are supplied from the same quarry. A model 100-B Bucyrus electric shovel loads the material into 8-yd. all-steel Easton cars which are pushed to the foot of the crusherhouse incline by a Davenport gas-electric locomotive from which point they are drawn up to the crusher by a friction hoist.

First Stages of Blending

After passing through a 42-inch McCully gyratory and a Gruendler hammer mill the material, now reduced to a size suitable for feeding to the grinding mills, is trans-

ported by belt conveyor to the screen house where it is separated into three sizes by means of a 72- by 28-ft. Galland-Henning rollerless screen. This screen serves two purposes. In addition to classifying the materials as to size for commercial uses it makes a rather good separation of the low-limed and the high-limed material, all the clay and shale going in with the fines due to the difference in size which results from the greater hardness of the limestone as compared with the clay and shale. The bins containing the separated materials all discharge onto a common belt conveyor which takes the material to the mills or to storage. The amount discharged from any one bin at a time can be regulated by a slide in the discharge chute.

This system of blending, made possible by the separation and concentration mentioned above, permits a certain amount of regulation of the percentage of lime carried in the stockpiles. The advantages of such a system are readily apparent to those familiar with the requirements of quality production, since the more uniform all the materials entering the storage are, and the closer they approach the desired standard mixture early in the process, the less chances there are for wide variations in the final mixture.

From the screen house the materials are conveyed to the raw storage building where they are run into bins over the raw grinding units, the surplus spilling into the storage where it is placed in one of two piles according to its lime content. These piles are classified, for convenience, as “high-limed” and “low-limed.” This surplus is reclaimed from storage by two P & H 2½-yd. bucket overhead cranes.

Wet Blending

The raw materials are ground in three Allis-Chalmers No. 726 wet compeb mills, fitted with circular table feeders. Each mill is fitted with two feeders, one to supply the low-limed and the other the high-limed material. The proportions of the high- and low-limed material going to the mills can be closely regulated by varying the height of the telescope on the feeder pipe or by a change in the “bite” of the scraper.

*Report on the “Rock Possibilities of Scott County,” by L. W. Wood, Inspector, Iowa State Highway Commission.

(20 ft. by 42 ft. depth) where it is mixed and kept under constant and thorough agitation by Minogue mechanical-air agitators until ready for use. Only one tank receives the mill stream at a time, so while one tank is being filled the others can be under test, held for future use or be drained into the mixing tanks. This allows separate batches of slurry to be analyzed and the composition of the mill stream varied to conform to the mix requirements.

Of the nine tanks, six are used for mill storage while the other three are employed for storing corrected mix. By a special system of piping, slurry can be pumped from any one of the nine tanks into any other one but the slurry stream coming from the mills cannot be pumped directly into the three mix tanks. This system does away with the possibility of errors which might ordinarily occur from directing the mill stream into corrected mix through oversight.

After being sampled and blended to bring it to standard, the slurry is pumped to three 20 ft. diameter by 22 ft. depth tanks which are situated under the feed end of the kilns and which serve as storage basins for the kiln feed. An excess of slurry over that required by the kilns is drawn from these tanks and elevated to two-speed ferris wheel feeders, the excess being returned to the storage tank. This system serves to keep a constant and uniform supply in the feeders at all times, a desirable feature of any such feeder. By sending the excess slurry back to the supply tanks a more uniform mix is assured since the revolving load serves to keep down any segregation which might occur in the mix and helps to blend the incoming slurry with that already in the tanks.

Burning

The burning is done in three 11 ft. by 175 ft. Allis-Chalmers kilns. Powdered coal is used as fuel. Preheated air is blown in with the coal.

The clinker before being placed in the storage pile is run through a rotary cooler which serves the double purpose of cooling the clinker and preheating some of the air used in burning in the kiln. The coolers discharge into a pit from which the clinker is taken by the two P & H cranes mentioned above, and is either put directly into the bins over the finish grinding mills or into storage.

Gypsum, for regulating the setting properties of the finished cement, is added to the clinker just before it drops into the grinding unit. The clinker is fed to three Allis-Chalmers No. 726 compeb mills by means of a table feeder similar to those used to supply the feed to the raw mills, while the gypsum is fed by a slow-moving screw conveyor. Both feeders are connected to the same drive by chain drives, and are easily regulated so as to deliver the desired amount of material.

The finished cement is pumped to a battery of concrete storage silos by Fuller-Kinyon pumps. Bates packers are used in sacking the cement.

A. S. M. E. Will Convene in Twin Cities for Summer Meeting

The American Society of Mechanical Engineers will hold its summer meeting at St. Paul and Minneapolis on August 27th to 30th inclusive. Headquarters will be at the St. Paul Hotel.

Council meeting will be held on Monday morning, followed by technical sessions in the afternoon. Technical sessions will also be held the following three mornings, leaving afternoons free for visits to the Twin Cities' industrial plants.

Blaine S. Smith Becomes President of Pennsylvania-Dixie Corporation

Blaine S. Smith has resigned as vice-president of the Universal Portland Cement Company to become president of the Pennsylvania-Dixie Cement Corporation succeeding John A. Miller, who becomes chairman of the board. Mr. Miller has been active in the cement business for over 30 years and prior to the formation of the Pennsylvania-Dixie corporation he was president of two companies which became part of the merger. The Pennsylvania-Dixie corporation has its general offices in New York and owns seven plants in the East and South with a capacity of 11,000,000 barrels of cement annually.

Mr. Smith started work in the traffic department of the Chicago and Northwestern Railroad in Chicago and in 1908 came to the Universal company. Within seven years he was made general sales manager, where he is credited with having developed a very efficient selling organization. Later, he was elected vice-president.

In addition to his work with his own company, Mr. Smith served on various committees of the Portland Ce-



ment Association, for three years was chairman of the Committee on Advertising and Publicity, for two years was vice-president and in 1924 was elected and the following year re-elected president of that organization.

Besides his work in the cement industry, Mr. Smith has spent much time furthering business and industrial interests generally. He has been actively identified with the Chicago Association of Commerce, as chairman and member of important committees, as general secretary and as vice-president. He also is on the board of the Illinois Chamber of Commerce and is a director of the National Bank of Republic of Chicago.

Mr. Smith is a member of the American Society for Testing Materials, American Concrete Institute and the Western Society of Engineers.

National Lime Association Adopts New Program

BY far the most important thing which happened at the convention of the National Lime Association held at the Belmont Hotel, New York City, on May 23rd and 24th, was the adoption of a report of the organization committee which places the operations of the association on a new basis, and provides for a definite plan of activity for the coming year.

This report, constituting as it does the platform of the association for the coming year, is of sufficient importance to be presented to our readers in its entirety. It is well worth careful reading and studying on the part of anyone who is interested in the lime industry.

The report is as follows:

"Your Committee on Organization has the following recommendations to make, based on their unanimous opinion that the association must proceed on a broader and more constructive basis or else cease to exist.

"Commencing July 1, 1928, the dues for the next fiscal year shall be two cents (2c) per ton for burned lime products sold during the calendar year 1927.

"That all outstanding certificates of indebtedness be paid in full at maturity.

"That necessary steps be taken immediately to dispose of the present lease on the offices at Washington and that less expensive space be obtained to care for the smaller organization. That the surplus furniture and office equipment be sold, but that the laboratory equipment be retained for future use.

"That an executive committee of five (5) be elected by the committee, which shall assume the active management of the association. This executive committee to elect its own chairman. The directors shall meet with the executive committee at least twice a year, or more often, at the discretion of the executive committee.

"That a capable business man (preferably not in the industry) be employed as general manager to direct the activities of the association, but whose principal duty shall be to assist in the organization of the membership into district groups, and to render real service to individuals and groups to more actively promote the lime industry in the manner best suited to various sections as groups are organized.

"That a headquarters organization be maintained which will be capable of representing the industry properly and intelligently in its contact with the public.

"From the funds available technical research will not be possible in the association's budget but should be carried on in commercial laboratories from special funds appropriated by group organizations.

"That the invitation of the Treasury Department to appoint a committee of operating men to co-operate with government agencies be accepted, and this committee shall establish a standard depreciation schedule for plants and equipment, and from this basis vigorously pursue lines of study that will help to establish true cost records throughout the industry."

Respectfully submitted,

BERNARD L. McNULTY

GEORGE B. WOOD

J. L. DURNELL

REED BYE

JOHN M. CHILES

The executive committee elected to put this program in operation was as follows: J. L. Durnell, J. M. Deeley, A. B. Mack, J. M. Gager, and H. B. Mathews. Ralph Wilton was elected treasurer.

It seems probable that the program laid down in the organization report is one which will enlist the support of the lime industry as a whole. The new dues of 2 cents per ton will provide an annual budget of \$40,000 to \$50,000 with the present membership, and this amount will increase in proportion as new members are secured for the association. While the dues at present set are not excessive, the total budget is already sufficient to provide for enough activity to make the association a practical asset to its members.

The first meeting of the new executive committee was scheduled for June 12th, at which time it was planned to put the new program in operation, and to take over the active charge of association affairs from the former general manager, G. B. Arthur, whose resignation was offered and accepted at the convention.

Ideal Cement Company to Change Its Financial Structure

At a special meeting of its stockholders held in Denver, Colo., June 15th, the financial structure of the Ideal Cement Company underwent several changes, all of which help the present holders of its securities and assure the holders of common stock of a more bounteous return on their investment. While the change will take some time to bring about, however, when it is accomplished, the company will have out but one kind of stock and no funded indebtedness.

The proposals voted on favorably were:

1. A plan to issue as of July 1, 1928, \$8,500,000 in 15-year 5 per cent convertible gold debentures, callable at not to exceed 105, and to offer such debentures in exchange for the outstanding preferred stock at the rate of \$1,100 debentures for each \$1,000 preferred.

2. An offer for subscription at 100 by both preferred and common stockholders of any debentures not issued in exchange for preferred.

3. A plan to sell Boettcher & Co., and Newton & Co., underwriters, such of the debentures as are not exchanged for preferred stock or are not subscribed for by stockholders.

4. To call for redemption at \$110 per share and accrued dividend any preferred stock not exchanged for debentures.

5. To issue new common stock as of July 1, 1928, in the ratio of two shares for each one share of common stock now outstanding.

Exchange of preferred stock for debentures may be made up until noon of June 30, 1928.

Conversion of the debentures into common stock is provided for at the rate of \$75 a share from July 1, 1928, to July 1, 1929. For each of the succeeding years until July 1, 1933, conversion is provided for at an increase of \$5 per share per year.

The present capital structure of the company consists of 7 per cent preferred stock in the amount of \$12,500,000, of which there is now \$7,725,400 outstanding and 250,000 shares of authorized no par common, of which there are outstanding 200,056 shares. An estimated annual saving of \$200,000 will be made after the change.

After the recapitalization program is carried out, the financial structure will consist of \$8,500,000 15-year 5 per cent gold debentures, and an authorized 600,000 shares of no par common, of which 400,112 shares will be outstanding. It is planned to hold not to exceed 111,765 shares of the common as a reserve against conversion of debentures until July 1, 1933.

Tariff Revision Urged at Spring Meeting of Portland Cement Association

Cement Manufacturers Meet in New York City—Adopt Resolution Urging Portland Cement Be Stricken from Free List—Ten Plants Awarded Safety Trophies—Constructive Papers on Program—Sessions Well Attended

HIGH spots of the recent Spring meeting of the Portland Cement Association in New York City were the adoption of a resolution regarding prompt tariff revision by Congress, an interesting discussion of technical problems, the award of 1927 safety trophies, and the president's address, which dealt partly with the imported cement problem and partly with the problem of production costs. The meeting took place May 21st to 23rd, at the Biltmore Hotel, and was attended by 280 representatives of 59 manufacturing companies.

The convention opened on Monday, May 21st, with meetings of committees on conservation, transportation, and a meeting of the Board of Directors. The General Session, for discussion of technical problems which followed, brought out an interesting program, including a symposium on coolers.

Presentation of Papers

Papers on "Unax Coolers" by W. J. Fullerton, plant manager, and E. S. Hill, superintendent, Howe's Cave plant, North American Cement Corporation; and "Pressure Coolers" by W. M. Harbaugh, field engineer, Lehigh Portland Cement Company, Allentown, Pa., comprised the symposium. A paper on "Stores Control" was presented by R. B. Fortuin, assistant to general manager, Pennsylvania-Dixie Cement Corporation, Nazereth, Pa. F. R. McMillan, director of research, Portland Cement Association, Chicago, presented a discussion of "Factors Affecting Durability of Concrete."

The features of the general business session on the following day were memorial services, the reports of the treasurer and board of directors, the president's address, and the presentation of safety trophies for 1927. C. H. Boynton, assistant to the president of the Atlas Portland Cement Company also discussed the tariff situation.

Preceding the close of this session, formal award of the Association safety trophies was made by David M. Kirk, president of the Crescent Portland Cement Company, to the following mills: Alpha Portland Cement Co., Ironton, Ohio; Alpha Portland Cement Co., Martins Creek, Pa. (Plant No. 3); Canada Cement Co., Ltd., Belleville, Ont.; Canada Cement Co., Ltd., Hull, Quebec; Cowell Portland Cement Co., Cowell, Cal.; Kansas Portland Cement Co., Bonner Springs, Kans.; Lehigh Portland Cement Co., Iola, Kans.; Lehigh Portland Cement Co., New Castle, Pa. (Plant No. 3); San Antonio Portland Cement Co., San Antonio, Tex.; Universal Portland Cement Co., Duluth, Minn.

At the Wednesday business session, W. D. Lober, president of the Vulcanite Portland Cement Company, presented to the association the original circular letter which brought together representatives of 24 cement companies in a meeting in New York City during September, 1902, and which resulted in the present organization. The docu-

ment is to occupy an honored place in the archives of the Portland Cement Association.

Two hundred and eighty-five member representatives, staff officials and guests attended the formal dinner which closed the Spring meeting. President G. S. Brown presided and introduced Charles E. Ulrickson, vice-president and general manager of the Trinity Portland Cement Company, as toastmaster. After giving a brief review of the recent municipal improvement campaign at Dallas, Texas, with which he was intimately connected, Mr. Ulrickson presented Merle Thorpe, editor of "Nation's Business," as the speaker of the evening. Mr. Thorpe reviewed the tendency to organized collective promotion by industries and the beneficial effects that result. He laid stress on the necessity for such co-operation, even to the largest corporations, as a means of combating unintelligent competition within an industry.

President's Address

In his address at the Wednesday business session, President Brown expressed himself as of the opinion that with the removal of foreign cement from the United States market, the industry would compare favorably with others in general at the present time. The president's address, in full, was as follows:

"The six months that have elapsed since we last met have been active ones for the officers and employees of your association. Our industry continues to make records—1927 showing a new record in consumption and production of portland cement, and, while the first four months of this year have been somewhat disappointing in that consumption has been less than for the same period in 1927, there seems to me to be every indication that we shall, as a whole, probably end the year without much, if any loss, and perhaps with some small gain. Encouraging as this outlook is by comparison with many other industries, whose prospect is distinctly curtailed consumption, there is still with us the fact that we are working on a dangerously narrow profit margin.

"Profits in the industry in the United States were generally less in 1926 than in 1925, and such statements as have been published for 1927 show still smaller returns than 1926. Were it not that the industry generally had, during the last six or seven years, used earnings with lavish hand in modernizing its plants, and applied skillfully the knowledge gained through association statistics in reducing the use of coal and labor, we might be without any profits.

"In the Conservation Committee Report a comparison is given showing the use of labor in our plants year by year for the last six years. This table shows that in this single item there has been a reduction during the six year period of 19 per cent. The application of the heat, formerly wasted from the kiln stacks, to the production of power

through waste heat boilers has reduced cost. Loss due to accidents has been greatly reduced as shown in the Accident Prevention Committee's Report, where in parallel columns the accidents for the years 1925, 1926 and 1927 are shown month by month. With one exception the same month in each shows fewer accidents than in the preceding year, although in each year more mills were reporting.

"Our engineers have been active in designing methods in quarry and mill to cheapen the cost of manufacture without reducing the quality of the product—in fact, all that has been done in the way of economy has been done despite the fact that quality as at present measured has materially improved. We have made a start in gathering statistics in regard to selling costs and in improving the work of our salesmen. The Association is providing information which will enable them, if it is used, to become salesmen for cement and its uses rather than, as they have been in many cases, mere order takers.

Competing Materials

"Whether the cement industry has kept pace with other industries in cost reduction, we have no accurate means of knowing. Such data as we have would indicate that, generally speaking, it has done so, although probably more attention has been paid to cost reduction by all industry in recent years than to any other factor in the profits equation. However, little has been done so far as distribution costs are concerned. While we have not succeeded as we have in manufacturing costs, nevertheless we have made a start. We can, therefore, go to the public with clean hands. We are not asking to be paid for inefficiency, incompetency, or extravagance. We must meet the competition of substituting materials with the best defense—that of forcing the fight to place our own commodity in the van of construction materials. Those substitutes made in the United States under the same laws by which we are governed, using the same labor with the same wage scale, provide a spur to keep us on our toes to insure that quality shall remain high, that efficiency in production and distribution shall be maintained and that extravagance shall be eliminated.

"But how are we to meet the competition of foreign cement, manufactured under laws which are the antithesis of ours in that, instead of making illegal any agreements as to price to be charged, curtailment of production and division of territory, actually foster these practices which are banned by our law? This foreign cement is distributed under a system of freight rates, which, in effect, subsidizes exports to such a degree that freight for 3500 miles costs less than we must pay for 60 miles. Labor gets about one-fifth the wage our labor receives, forcing wife and children to labor in order that the family may have a bare subsistence. In theory, I have no quarrel with the man who would have us enable the nations of Europe to pay their war and other debts to the United States. But I would rather we provide the means, if we must provide them, through the expenditures of our well paid citizens who visit those ancient lands rather than from the wages of our American labor. For every barrel of cement imported to this country some American laborer loses over an hour's pay.

Effect of Foreign Cement on Financing

"Were this menace of imported cement removed so that our seaboard markets would give us as good a return as our interior markets, I would consider our industry satisfactory when compared with industry in general. This is excepting one or two regions where capacity to produce is very excessive. I am inclined to think that our investors

must definitely accustom themselves to a lower return on invested money, particularly in those industries manufacturing a standard material such as ours. We are receiving encouragement in our campaign for a tariff on cement, but that relief is in the future. For the present we must content ourselves by putting up as strong a fight as we can in order that taxes taken from us be not used to take further work from labor. It is already suffering from curtailed opportunity to work in this country due to the importation of various materials. In some sections of the country, price of cement is already so low that manufacturers are withdrawing from seaboard markets and curtailing production rather than continue selling their product for less than it costs to make. It is very apparent to me that unless our legislators recognize the logic of these facts, we cannot expect the high wage of the present to continue. The plight of the farmer may be bad, but it will be worse if labor is unable to live on the high scale it now enjoys.

"This meeting will have before it for action today a resolution which recognizes at once the condition and the cure. It urges that this menace not only to our own but other key industries be placed before the electorate in the coming national canvass by both political parties in the form of platform promises to correct this evil by prompt tariff action. It seems to me the cement industry cannot do less than adopt and press this policy."

Resolution Adopted

The tariff resolution mentioned by President Brown and adopted by the meeting read as follows:

Whereas, portland cement is on the free list of the existing tariff law, and the American Portland Cement Industry, operating 150 mills in 32 states of the United States and representing more than \$600,000,000 in invested capital, is vitally affected by increasingly serious invasion of its home markets by cement manufactured by cheap foreign labor under low standards of living and general production costs that are much smaller, and

Whereas, the products of other important industries, likewise on the free list, are suffering similarly, both directly and indirectly affecting general national prosperity, thereby threatening American standards of living which it is the purpose of the tariff law to maintain and creating a situation that strikingly emphasizes the need for prompt changes in the tariff structure by legislative action in Congress, and

Whereas, the national conventions of the major political parties will soon place before the electorate the platforms on which they will ask the return of their candidates in the forthcoming national elections, therefore be it

RESOLVED, that the Portland Cement Industry assembled in semi-annual meeting in New York City, May 23, 1928, regards prompt tariff revision by Congress as a national need of first importance and one which should be pledged by both parties in their political platforms.

Leipzig Fair

The Leipzig Fair, said to be the largest trade exposition in the world, will be held from August 26th to September 1st, at Leipzig, Germany. The fair will attract buyers from 43 countries, while a score of countries are expected to send some 10,000 exhibits. America's growing activity in world markets is indicated by her sending upward of 2,000 buyers and some 50 exhibits to this market.

Information concerning the fair may be obtained by addressing the Leipzig Trade Fair, Inc., 11 West 42nd Street, New York City.

The Chemistry of High Early Strength Cements

The Importance of Chemical Control on the Quality of Portland Cement, Especially on Early Hardening—Relation of Hydraulic Factors to Early Hardening—Velo Cement—Bauxitland Cement—Fluxes—Effect of Chlorine Compounds on Rate of Hardening

By DR. HANS KUEHL

IT is generally believed at the present time that the manufacture of high early strength cements is primarily a mechanical problem. While this opinion is widely prevalent, especial emphasis should be placed upon the chemical factors which affect the manufacture of special cement.

Although relatively little importance is usually attached to the effect of chemistry in this regard, I have been able to establish the fact that chemistry was present as a sponsor, though unrecognized as such, in the initial experiments made in the manufacture of special cements. The product of the early experiments made by Spindel in Austria did not by any means owe its superior initial strength to an increase of the lime content of the raw cement mixture. Its hydraulic modulus remained only approximately between 2.0 and 2.1, but its high early strength was due to the favorable hydraulic factor expressed in the low silicic acid (silica) content and the high alumina content.¹

Even if it is conceded that these cements can be manufactured at the present time from any kind of raw material without the use of chemical admixtures, taking for granted that great care in manufacturing operations and up-to-date equipment are used, stress must be placed on the fact that the chemical viewpoint is of great moment. This refers not only to the future development of special cements but also to those cases where the most modern cement mill equipment is not available and where the demand for them is active.

Chemistry must play an even more important role under these conditions. I will endeavor to point out how chemistry can assist manufacturers, outlining my suggestions in two divisions. The first will discuss those points relating to the chemical influences of the raw mixture. The second will point out means by which it is possible to increase the rate of hardening of the finished cement.

It is true that normal raw mixes must have a lime content and that once the correct proportion of lime has been established, it must be maintained at that point. Yet it is also true that the remaining ingredients of the cement, especially the three hydraulic factors, namely, silica, alumina and iron oxide, are able to affect the quality and properties of the products that are made from them.

Relation of Hydraulic Factors to Early Hardening

I have studied the relation of the individual hydraulic factors to the hardening of cements for almost a score of years, and I reported the results of my investigations for the first time in 1911 in my address on the correction of

chemically imperfect raw materials. Today I am able to make the following statements definitely. If the silicate modulus of a given raw mixture is so changed by the addition of silica, alumina and iron oxide, that this modulus gradually passes through an entire series of very high to very low values, then it is found (assuming that the correct proportion of lime is present in the mixture) that the burning of the cement is uniform and that the fineness of grinding is regular throughout. The best grades of cements are obtained at the extreme values of the silicate modulus. On the other hand, cements of lower grade and poorer properties are obtained at the average values of the silicate modulus. In other words, the greatest strengths are obtained (1) with cements that contain a very large proportion of silica, and (2) with cements that contain a very low percentage of silica.

This fact has found technical expression in two manufacturing processes, whose products are being marketed under the names of Velo cement and Bauxitland cement.

Velo Cement

Velo cement contains a very high proportion of silica, and its manufacture is recommended by the F. L. Smidth Co. of Copenhagen, Denmark. It has been found to be an outstanding product, when it is manufactured exactly in accordance with specifications. Velo cement possesses a silicate modulus of 3 to 4, according to information available to me. Its hydraulic modulus, as it corresponds to the silica content, has been increased to a high point and is approximately 2.3, and in extreme cases even as high as 2.4.

Inasmuch as raw materials with such a high silica content are seldom found in nature, the silica content of the raw cement mixture must be artificially increased. This is accomplished by the addition of sand, quartz or flint. According to my experience in this field, flint fulfills this function best because it reacts most easily in the burning process. A raw mix suitable for the manufacture of Velo cement must be combined in such a manner that the proportion of lime is maintained very accurately at that point which has been found to be correct in a preliminary test. The raw mixture must be ground to an extremely fine powder.

Such a raw cement mixture, containing high proportions of lime and silica, must be burned at a very high temperature when special aids are not employed. It is, therefore, recommended that some fluorspar be added to the mix to facilitate burning. Whether or not other fluxes can be used with equally good results is not known to me. The clinker must be very finely ground, because cements containing a large proportion of silica harden slowly, this being their

An address delivered at the Fifty-First General Meeting of the Association of German Portland Cement Manufacturers and translated from *Zement*.
¹*Wochenschrift fuer den oeffentlichen Baudienst*, 1915, No. 41.

peculiar characteristic. This disadvantage can be overcome only by very fine grinding.

The technical properties of Velo cement are strikingly good, even though it has also been shown that the strength of the cement in tension does not match in every respect its great strength in compression. This is a phenomenon which has been observed not only in the case of special cements which contain a high proportion of lime, but also in the case of aluminous cements, which contain low percentages of lime. From a technical standpoint the manufacture of Velo cement is recommended for very modern cement mills equipped to maintain the proportion of lime within very close limits. It is important that this very sensitive ingredient be protected against variation.

Bauxitland Cement

A cement containing a small proportion of silica is also known to me. It is, in a sense, the direct opposite of the Velo cement and contains a large proportion of lime. It was first manufactured by the firm of C. D. Wegener (German Patent No. 457,621) and has been named Bauxitland cement. The distinguishing feature of this cement is that the alumina content is maintained at as high a point as possible, and that the tendency of the cement to set rapidly—a characteristic which is connected with the high alumina content of the product—is compensated for by increasing the iron oxide content at the expense of the silica content.

My experience with this cement indicates that it is used with particularly advantageous results when the silicate modulus is held at approximately 1.25, and when the same value is chosen for the numerical relationship between the alumina and the iron oxide contents. A clinker which corresponds to these requirements contains approximately 18 per cent silica, 8 per cent alumina and $6\frac{1}{2}$ per cent iron oxide. Its lime content varies around approximately 65 per cent, which corresponds to a modulus of only 2.0.

Cements of this nature can be made from many raw materials merely by the addition of iron oxide. In most cases, however, it is necessary to add alumina to the mix in addition to the iron oxide. Waste bauxite has been used in preference to other materials for this purpose, but it is also practical to employ ash, which is rich in alumina, as well as slag for this purpose. Such materials are available in many places as wastes from manufacturing processes.

Velo cement represents the maximum quality product that can be made by modern wet process mills, while Bauxitland cement may be considered the maximum quality product of older cement mills, which operate at a lower efficiency, because this last type does not require particularly accurate control of the raw mix. Furthermore, the raw materials can be burned at a comparatively low temperature both in the shaft furnace and in the rotary kiln. I do not mean to say that the raw mix used in this process must neither be finely ground nor its composition accurately defined. It is self-evident that every raw mix has a maximum effectiveness which can be attained only when the conditions are especially favorable. However, it is characteristic of Bauxitland cement that the strength curve runs in a comparatively flat path to the left and to the right of the peak of the curve. This means that if the most favorable conditions in the preparation of the raw mix are not present, whether in fineness of grinding or accuracy of chemical composition, the quality of the product is not greatly affected.

The reason for this is enlightening. The raw mix, containing a large proportion of iron oxide, burns with extraordinary ease. That is why even a comparatively coarse

raw mix will produce a uniform clinker. Variations in the raw mix, not only from the mechanical standpoint but also from the chemical standpoint, have only a comparatively slight effect on the quality of the cement! If you realize that calcium silicates harden better when they combine with more lime, and that, in contradistinction to the aluminates, those compounds which are low in lime give the best results in mechanical strength tests, then it is understandable why a cement whose hardening capacity is uniformly related with its content of silicates and aluminates, combines these two properties. A curve obtained from the combination of high lime silicates and low lime aluminates will be comparatively flat at its highest point.

Another item of interest in the manufacture of Bauxitland cement is that the clinker does not need to be very finely ground in order to obtain a product with good strength characteristics. While it is true that the strength of the cement increases as the degree of fineness increases, the strength curve plotted in relation to fineness of finished cement is comparatively flat. The strength of the cement is usually satisfactory even when as much as 8 to 10 per cent of the residue is left on the screen containing 4900 mesh per square centimeter.

Laboratory Tests

Extensive mathematical data have been collected over a period of 9 months from a series of experiments carried out in an American cement mill under the direction of my assistant, Dr. Frenkel, on the process which has just been described. Although I am an outspoken opponent of the testing of cements after setting and hardening for 24 hours, I had to agree with the wishes of the Americans and allow the determination of the quality of the cement to be made principally in accordance with this one-day strength test. The average results of an uninterrupted series of experiments lasting 24 days were a tensile strength of 265 pounds per square inch and a compressive strength of 2020 pounds per square inch. Almost the same results are obtained from the American figures as the standard German figures, when the values for the strength of the cement in tension are divided by eleven and when the figures for strength in compression are divided by eight. This would signify that, on the average, a cement is obtained with a strength in tension of 24 kilograms per square centimeter and a strength in compression of 253 kilograms per square centimeter, there being approximately 5 per cent residue on the American 200-mesh screen, which corresponds approximately to our 4900-mesh screen (meshes per square centimeter). This cement was tested after 24 hours and was produced on a large scale. The maximum values are considerably higher. They exceed 30 kilograms strength in tension and 350 kilograms per square centimeter strength in compression at 24 hours. The consumption of coal in the rotary kiln amounted to 19 per cent.

In order that you may not form the opinion that I stress only the advantages of this process which I have discovered, I will not hide the fact that there are also difficulties. These lie in the extraordinary ease of burning, which easily leads to the formation of masses of material which remain hanging to the walls when the process is carried out in the shaft furnace, and to the formation of rings in the rotary kiln when the latter is used. Inasmuch as this process has been tried more frequently in the rotary kiln than in the other type of apparatus, I can say something of a conclusive character only with respect to the rotary kiln. In every mill where the process was tried, interruptions in operation have occurred only through the formation of these rings, and also for the reason that the burners

could not be adapted to fire the kiln in a manner which meets the conditions of the new process. Later, when the burners were properly adjusted, it was possible at all times to overcome the difficulty or at any rate to confine the formation of rings within moderate limits. Dr. Frenkel was able to operate a rotary kiln installation in America for a continuous period of 24 days without interruption. The kilns were shut down after 24 days, not because of any difficulty in the operation, but because the tests were completed.

Fluxes Facilitate Burning

The two processes of which I have spoken seem to emphasize a disagreement as to the essential ingredients of raw mixes. I have recently established—but only by working with small quantities—that it is possible to materially increase the initial strength of cements when burning is facilitated by the addition of suitable fluxes. That it is possible to obtain very favorable effects by the addition of fluorspar to mixtures that burn with difficulty has been known for a long time. I would like to remind you that other materials also will produce the same result and that new effects can be produced by use of larger quantities of fluorspar. I base these statements on investigations which have been carried out over a period of years in my laboratories by Messrs. Wehrmann and Becker.

These investigators have found that it is possible to manufacture cements when considerable quantities of fluorspar are added which are almost of maximum quality, and this can be done when the cements are burned at low temperatures, between 1000 to 1100 degrees C. I have myself published an article in 1924 in *Zement* (See *Zement*, year 1924, pages 21ff), in which I indicated that tensile strength values of 22 kilograms per square centimeter and compressive strength values of 308 kilograms per square centimeter can be obtained at three days with cements rich in fluorspar and which are burned at temperatures between 1000 and 1100 degrees C.

The manufacture of such easily burned cements is not being carried on generally at this time because the development of the cement industry is directed toward the manufacture of hard-burned cements.

Calcium Chloride

Another flux with which we have experimented for some time is calcium chloride. Investigations on this material have not yet been completed, but they show clearly that the burning of the raw mix is facilitated by the addition of a couple of per cent of calcium chloride to the raw mixture, and that the initial strength of the cement is materially increased. When the quantity of the admixture is small, both of fluorspar and of calcium chloride, there is a tendency to increase the hydraulic modulus. This is because volatile compounds are formed from the sesquioxides in the raw mix and the halogens of the added substances, and that these volatile substances are partially vaporized. We are particularly concerned in this connection with iron chloride and iron fluoride, and to a partial degree also with aluminum chloride and aluminum fluoride. Inasmuch as the sesquioxides and the halogens in cement play the role of acid radicals, their presence denotes a reduction of acid ingredients in the cement, and corresponding with that an increase in the hydraulic modulus. This must be taken into consideration in making up the raw mix.

Whether the favorable effect which was obtained through the addition of calcium chloride to the raw mix was actually brought about by facilitating the burning or whether

the calcium chloride which is still contained in the clinker after burning, is responsible for the observed increase in the initial strength of the cement, is a question which I am not able to answer at the present time.

Increasing Early Strength Qualities of Clinker

We now come to the question as to how far the rate of hardening which is inherent in the clinker after burning is capable of being increased, how this can be done, and what effect it will have in increasing the early strength of the cement.

The fact that the hardening of silicates can be very materially increased merely by the addition of several different substances, is known from the chemistry of blast furnace slag. We have learned that an amazing increase in the speed of hardening of blast furnace slag can be obtained both through physical (mechanical) treatment of the slag and also by chemical acceleration. It is true that this discovery was the first to point the way to the manufacture of cement from blast furnace slag on a commercial and practical scale.

It is also known that the speed of cooling is a matter of decided importance from the standpoint of the rate of hardening of the blast furnace slag cements. Only those slags which have been rapidly cooled are suitable for the manufacture of cement. This suggests that the speed of hardening, which is an inherent property of rapidly cooled slags, can be applied to cements principally by the use of alkaline and sulphate accelerators.

Does the portland cement clinker, which is generally cooled at a slow rate and which is ground with the addition of any special accelerator, offer us a similar opportunity? This question cannot be answered definitely in the negative, although an important difference exists between slags and clinker because we must consider slag with a melt, which involves the possibility of under-cooling. On the other hand, in clinker the crystalline structure is already pronounced by burning. The burning clinker is always unstable. Therefore the speed of burning and the speed of cooling are not without their influence on the early strength qualities of the clinker. We have found by experience that these favorable conditions in blast furnace slags cannot be attained in portland cement clinker by rapid cooling of the clinker, even though we know that the old rule still holds good, namely, that rapid burning and rapid cooling of the clinker improves the quality of the cement.

(To be Concluded)

New Books

Bauxite and Aluminum

BAUXITE AND ALUMINUM IN 1926. Published by the Bureau of Mines, Department of Commerce; prepared by Jas. M. Hill.

Bauxite, according to this publication, in the United States showed a decrease of 20 per cent in quantity of production and 21 per cent in value in 1926 as compared with the previous year. Exports showed an increase while imports tended in the opposite direction.

Under the subhead, "Market and Prices," it is stated that in 1925 and 1926 the manufacturers of alumina cements were largely supplied by imported bauxite. A list of producers and consumers follows.

Other chapters cover bauxite in the United States by states, and in foreign countries.

Anti-Foreign Cement Folder Published by Building Material Association

The accompanying illustration depicts the first page of a four-page folder presenting a few facts and figures concerning the invasion of foreign cement into American

Use of Foreign Cement costs me my job!

Use American Cement and keep me at my job!



ELEVEN MILLION BARRELS OF FOREIGN CEMENT—
Sold in American Markets Since 1922

—Cost American Wage Earners:

Cement Workers . . . \$5,254,655	Power Workers . . . \$353,759
Rail Workers . . . 3,345,997	Machinery Workers . . . 425,502
Mine Workers . . . 1,346,916	Textile Workers . . . 527,134

Lost! American Workers 1,905,956 Working Days
American Payrolls . . . 11,253,963 Dollars

markets. On the inside pages are found illustrations of such cement in storage in government warehouses, and its economic cost to American industry.

The National Builders Supply Association, at Cleveland, Ohio, is responsible for the publication of the folder.

Marquette Leads Among Quarries in 1927 National Safety Competition

In the National Safety Competition, sponsored by the Bureau of Mines during 1927, the best record among mines producing nonmetallic minerals other than coal was established by the Marquette Cement Manufacturing Company at the company's limestone mine at La Salle, La Salle County, Illinois. This mine was operated without a lost-time accident in 1927. During the year the employees worked 205,601 man-hours.

Honorable mention, in the nonmetallic mineral mine group, was given the Ironton cement rock mine of the Alpha Portland Cement Company, Ironton, Ohio; the Missouri Portland Cement Company limestone mine, Cement City, Missouri; the Manheim cement rock mine of the Alpha Portland Cement Company, Manheim, West Virginia; and the Southard gypsum mine of the United States Gypsum Company, Southard, Oklahoma.

The leading plant among quarries and open-pit mines was the Mitchell limestone quarry, at Mitchell, Lawrence County, Indiana, operated by the Lehigh Portland Cement Company. The Mitchell quarry and crusher were operated without a lost-time accident in 1927; its volume of exposure was 308,886 man-hours.

In the quarry and open-pit mine group, honorable men-

tion was given the following contestants:

Ormrod limestone quarry, of the Lehigh Portland Cement Company, Ormrod, Pa.; Union Bridge limestone quarry, of the Lehigh Portland Cement Company, Union Bridge, Md.; Security cement rock quarry, of the North American Cement Corporation, Security, Md.; Union Limestone Company quarry, Hillsville, Pa.; Bath limestone quarry, of the Lehigh Portland Cement Company, Bath, Pa.; Louisville Cement Company cement rock quarry, Speed, Ind.; Texas Portland Cement Company limestone and shale quarry, Dallas, Texas; Kansas Portland Cement Company limestone and shale quarry, Bonner Springs, Kan.; Ash Grove Lime and Portland Cement Company limestone quarry, Chanute, Kan.; Pennsylvania-Dixie Cement Corporation Plant No. 6 cement rock and limestone quarry, Nazareth, Pa.; Iola limestone quarry, of the Lehigh Portland Cement Company, Iola, Kan.; Cowell Portland Cement Company lime rock quarry, Cowell, Calif.; Alabama Portland Cement Company limestone quarry, Birmingham, Ala.; Lehigh Lime Company (Mitchell) limestone quarry, Mitchell, Ind.; Helderberg limestone quarry of the North American Cement Corporation, Howe's Cave, N. Y.; Sandt's Eddy limestone quarry of the Lehigh Portland Cement Company, Sandt's Eddy, Pa.; Sandusky Cement company limestone quarry (silica), Toledo, Ohio; Pennsylvania-Dixie Cement Corporation Plant No. 4 cement rock quarry, Nazareth, Pa.; Olive Hill Limestone Company crushed limestone quarry, Olive Hill, Ky.; Martins Creek No. 3 cement rock quarry, of the Alpha Portland Cement Company, Martins Creek, Pa.; Alabama Portland Cement Company shale quarry, Birmingham, Ala.; Bellevue cement rock quarry, of the Alpha Portland Cement Company, Bellevue, Mich., and Consolidated Cement Corporation limestone quarry, Mildred, Kan.

Two hundred and fifty-six mines and quarries, representing 31 states, were represented in the contest. The total amount of exposure to hazard was 91,919,812 man-hours.

The holding of the National Safety Competition in 1927 marked the third consecutive year of this notable endeavor to reduce, through the medium of friendly competition, the number of personal injuries in the mines and quarries of the United States. Competing companies were grouped into five classes, namely, anthracite mines, bituminous coal mines, metal mines, nonmetallic mineral mines, and quarries and open-pit mines. To the winning company in each group was awarded the bronze trophy, Sentinels of Safety, the gift of *The Explosives Engineer* magazine. The winner in each group was the mine or quarry whose record showed the smallest loss of time from accidents in proportion to the total amount of time worked by all employees.

Proposed Kentucky Plant Makes Price Agreement with State

The state of Kentucky has signed a contract with F. B. Drew, McAlaster, Okla., Leigh Hunt, New York City, and Robert Hunt, Kansas City, to erect a 4,000 bbl. per day capacity cement plant, 75 per cent of whose production will be purchased by the state during the next two years, at 8 1/3 cents below the price in nearby states.

Widespread publicity has been given to the fact that any city and community in the state interested in having the plant located in its section should communicate with the commission in charge. Up to the middle of June, 24 Kentucky cities, including Louisville, had entered offers of location.

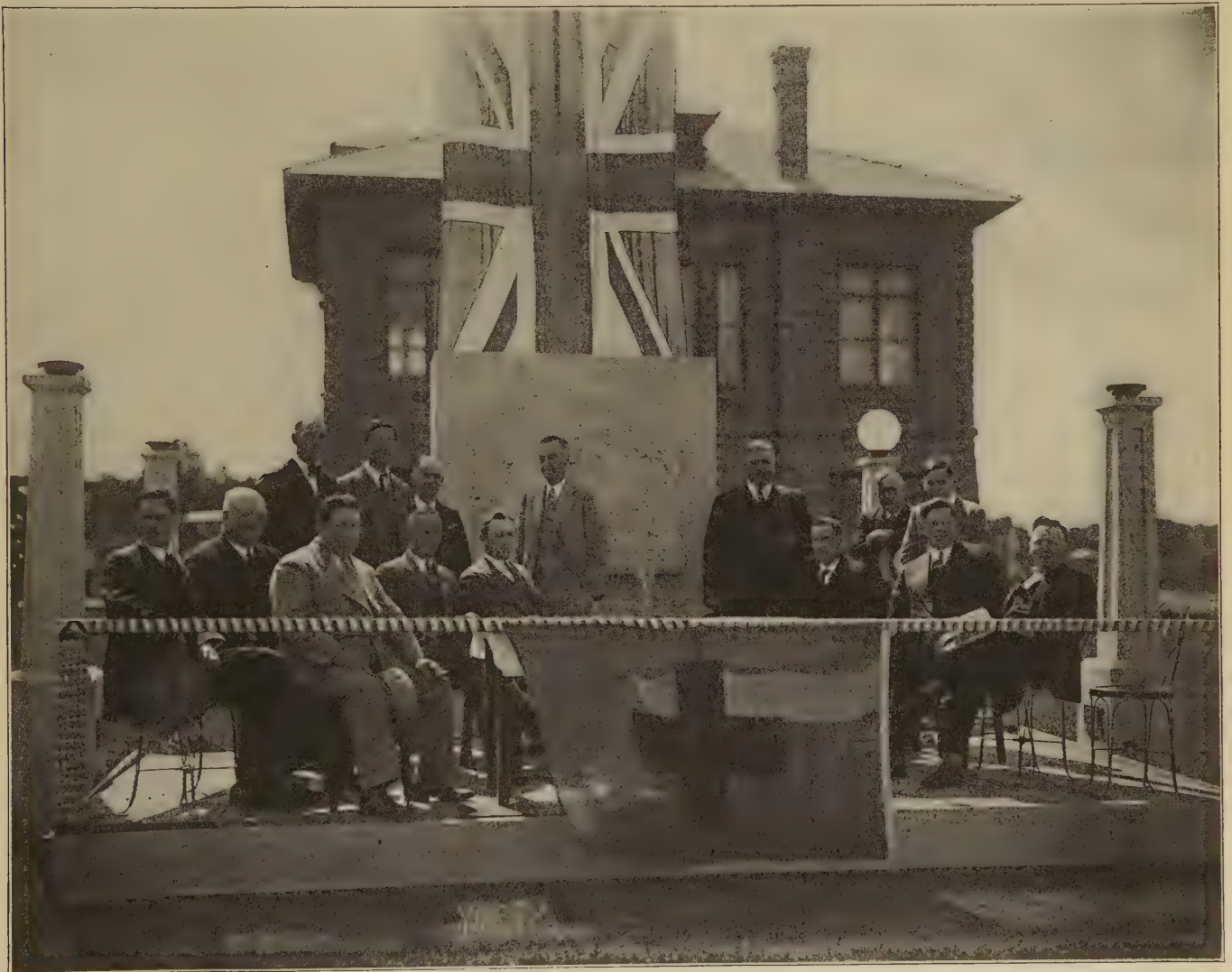
Plants Seek to Better Safety Record of 1927

Pre-Campaign Regional and Individual Plant Gatherings
Held in Preparation for June Drive — 1927 Trophies
To Be Dedicated Shortly—Two Canada Plants Hold
Ceremonies

WHETHER the 150 member mills of the Portland Cement Association bettered the June safety record of 1927 last month remains to be seen—and will be seen as soon as all reports have been compiled into one. It is to be hoped, though, that there will be only “zero” following “lost-time accidents” and “fatalities” on all report forms returned to the Portland Cement Association within the

next few days. Hopes are high, too, that all banners were in the air until midnight of June 30th.

In June, 1927, portland cement plants in the United States and Canada operated with only 56 lost-time accidents and one fatality. Less than one-seventh of one per cent of the 40,000 workers pledged were involved in accidents. There was thus a percentage of 99.86 who came



Scene at the dedication of the 1927 safety trophy awarded the Hull, Quebec, plant of the Canada Cement Company. Seated in the first row are: Theo. Lanctot, city engineer, Hull, Que. (in light suit); H. A. Bergeron, Ottawa district salesman, Canada Cement Company, Limited; E. French, superintendent, Plant No. 3; C. Boland, pro mayor, city of Hull, Que.; G. E. Warren, assistant general manager, Portland Cement Association; A. Guertin, M. L. A., Hull Representative, Quebec Parliament. In the back row, seated: A. Labelle; T. W. Bowler, representing Plant No. 5, Belleville, Ont.; W. G. H. Cam, power and safety engineer, Canada Cement Company, Limited; H. S. Wright, soliciting freight agent, Canadian National Railways; A. G. Beck, superintendent, Plant No. 1, Montreal, Quebec; J. Groulx, chief of police, city of Hull, Quebec; L. M. McDonald, superintendent, Plant No. 8, Port Colborne, Ont.; D. J. Johnson, vice-president and general manager, Canada Cement Company, Limited.

through with clean records. Counteracting the increase in the number of men employed in new mills or expanded plants this year is the fact that much careful educational work has been done by superintendents, foremen and workers during the past year.

On May 12th the 1928 safety flag was dedicated at the ten plants winning trophies for a year of no-accident operation during 1927. It was flown for one day and then taken down and put on display. Three days later banners were presented to all member companies in North and South America. Here the flag was put on display and workers told of the campaign.

Preparation for June Drive

A special meeting of all mill safety committees was held on May 21st to complete final plans and issue last-minute instructions. May 29th was designated as "Green Document Day," when all foremen and department heads signed a form certifying that they had investigated their divisions and found conditions satisfactory to operate without accidents.

Approximately 125 mass meetings were held on May 31st in which 43,000 workers took part. At that time pledge cards were signed by individual workmen.

In preparation for the June drive, as well as year-round safety work, twelve regional safety meetings were held earlier in the year. The first of these meetings was held in Birmingham, Alabama, on February 28th. J. W. Johnston, vice-president and general manager of the Alabama Portland Cement Company, presided. Plants in southeastern states were represented at this meeting.

Texas mills held their meeting in Dallas on April 6th. William Moeller, general superintendent of the Texas Portland Cement Company, was local chairman.

The third regional safety meeting was held by the Michigan mills, at Lansing, on April 12th. G. A. Lawniczak, superintendent of the Alpha Portland Cement Company, was chairman of the committee. One week later, cement mills located in Illinois and eastern Missouri sent representatives to La Salle, Illinois, for a safety meeting, where John Kelly, safety engineer of the Marquette Cement Manufacturing Company, presided.

The fifth regional safety meeting was held in Kansas City on April 24th for mills of Kansas, western Missouri, Nebraska and Oklahoma. The meeting was held in co-operation with the Central States Safety Congress, and F. E. Tyler, president of the Dewey Portland Cement Company, acted as general chairman.

Helmuth Krarup, superintendent of the Hawkeye Portland Cement Company, was local chairman of the Des Moines, Iowa, meeting held May 1st at Des Moines for Iowa and Minnesota mills.

Plants in the Lehigh Valley and the vicinity met in Easton, Pa., on May 25th. Russell Frame of the Alpha Portland Cement Company served as chairman.

D. S. MacBride, vice-president, Indiana Portland Cement Company, was local chairman for the Indianapolis, Ind., meeting, held at the Indianapolis Athletic Club on June 5th. Other meetings were held by eastern and central New York mills June 10th at Albany, N. Y.; Chesapeake region mills, June 15th, Washington, D. C.; mills of western Pennsylvania and Ohio at Pittsburgh, Pa., June 19th. California mills will meet early in October in San Francisco.

In addition to these regional safety meetings, celebrations in connection with the unveiling of Portland Cement Association trophies awarded for 1927 will be held at the following places during the early summer: Martins Creek and New Castle, Pa.; Ironton, Ohio; Bonner Springs and

Iola, Kan.; Duluth, Minn.; San Antonio, Texas; Cowell, Calif.

The Belleville, Ontario, and Hull, Quebec, plants of the Canada Cement Company, Ltd., were also accident-free during 1927 and celebrations during which their trophies were dedicated at the two plants were held recently.

J. H. Legate is superintendent of the Belleville plant and Elmer French superintendent at Hull. The Belleville plant worked 976,069 man-hours last year, while the Hull plant had 480,341.

The last lost-time accident occurring in the Belleville mill was on December 27, 1926, and up to this date there have been no lost-time accidents. This makes them potential winners for the trophy two years in succession. The last lost-time accident at the Hull mill occurred on December 2, 1926. They have had one accident in 1928—a fatality in April.

The Belleville mill had a partial disability last year which caused some controversy. Workman cut the end off his finger, but did not lose any time from work. The rules at that time stated if a mill sustained no "lost-time" accidents during the period from January 1st to December 31st of any year, that they were entitled to receive the trophy, or if no mill came through without a lost-time accident, then the mill having the best record, etc. The case of the Belleville mill was put before the committee and a vote taken, the majority deciding that they should be awarded the trophy. After the Belleville case came up it was decided by the committee to change the rules and this was done at the annual meeting last fall.

These two trophies make four won by the plants of the Canada company during three successive years—in 1925 one to the Port Colborne, Ont., plant; in 1926 one to the Fort Whyte plant, near Winnipeg, and the two awarded this year.

Address by Warren

Speaking before the gatherings at the trophy dedications in Canada, G. E. Warren of the association said in part:

"Disasters are sometimes unavoidable. Where manufacturing operations on a large scale are involved it was formerly believed that they were inevitable. How different a gathering of this kind from one in which employes and their families are drawn together due to serious accidents or disasters at the mills!

"Workmen, managers, financiers, in fact the general public, have come to recognize the importance of the human element or human problem in business. In my opinion there are no other problems in business but the human problems. Men design the mills, manufacture the machinery, assemble and construct the works; men operate the machines; men manage the mills; men sell the products; men and women do everything connected with the management, financing and operation of an industry. We are apt to think of a large company as a thing or an institution, but as a matter of fact it is made up of a large number of individuals, each with his division of the labor and each equally important, because all operations, subdivided though they may be, are required for completion of the processes.

"This occasion seems to me to mark in a most impressive and decisive manner the recognition of this fact, because the remarkable record with reference to accidents has been secured only by full co-operation and teamwork of every department and every man with each of his fellows.

"There was a time in all businesses, particularly at or near their beginnings, when an individual made or manufactured an entire product by himself. It was in the period

(Continued on Page 122)

EDITORIAL

Another Record Year

A GAIN the cement manufacturers of the United States broke all previous records in cement production and shipments. Though this increase in shipments and production was accomplished with an average reduction of 9 cents in selling price, it is a very real accomplishment. Many another industry looks longingly at the 76 per cent relation between capacity and actual production.

The cement industry is to be particularly commended for the operating economies that it has effected during the past few years. Were it not for these, and the savings made through accident prevention, the 9-cent drop in price of cement would have worked a real hardship.

This same problem continues to face the cement manufacturer as it does the concrete products manufacturer and the concrete contractor. It is in increased technical knowledge both in the manufacture and uses of cement that the continued progress of the industry lies. Through research and the free distribution of information only can this be accomplished.

In common with all other industries, the manufacturer and the user of cement must overcome the effect of a narrowing margin of profit with more efficient operation. Nothing will help more to bring this about than a free interchange of experience.

Foreign Cement

IN his address before the recent meeting of the Portland Cement Association, Mr. Brown urges that a tariff be placed on cement imported into the United States. Mr. Brown puts his plea on a sound basis when he says, "Our engineers have been active in designing methods in quarry and mill to cheapen the cost of manufacture without reducing the quality of the product. We can go to the public with clean hands. We are not asking to be paid for inefficiency, incompetency, or extravagance. Competition from materials made in the United States under the same laws by which we are governed, using the same labor, with the same wage scale provide a spur to keep us on our toes. But how are we to meet the competition of foreign cement, manufactured under laws which are the antithesis of ours, laws which actually foster practices which are banned by our law?"

Here is a fair and logical plea. The resolution adopted by the Association urging prompt tariff revision by Congress deserves careful consideration by that body.

Other nations are faced by the same problem and are active in fighting cement importation. Almost

every issue of the British engineering journals carries an advertisement urging the use of British cement in British construction. These pleas are based on the same sound arguments used by the American cement manufacturers.

As has previously been pointed out in these pages, it is necessary for the cement industry to convince cement users and the public that a protective tariff is for their own ultimate good and that it is not sought as a special benefit for a few manufacturers. The "fair play" plea in Mr. Brown's address will help them to see the manufacturers' point of view.

The June Campaign

R EPORTS on the June no-accident campaign coming in just before this issue goes to press show a substantial gain over last year's June campaign. Up until the 25th of the month only 16 accidents were reported as against 59 during June, 1926. Of 164 plants reporting, 149 have gone so far through the month without a lost-time accident. Incidentally, 56 plants have gone all of 1928 without an accident.

Such a record cannot be too highly commended. The eyes of all industry are on the cement manufacturers, watching their efforts in stamping out accidents. The beneficial effects of this work are not confined to the cement industry, though there they are of tremendous importance, but by example and precept, the cement manufacturers are encouraging all industry in this humanitarian work.

Classification of Cements

THE need for classifying the various types of cements now marketed in the United States has been urged before in these columns. Daily almost, the need becomes more urgent.

It is a difficult problem, it is true and it is only natural that it should be approached reluctantly. It is not necessary now to formulate definite specifications for each type. There are still many problems to be ironed out in the present standard specifications.

But some attempt to group the various types of cements according to their major characteristics, such as high early strength, plasticity, etc., must be made in justice to the purchaser. The chaotic condition now existing simply bewilders the buyer and leads to nothing constructive for the cement manufacturer.

Cement Plants Operate at 76.3 Per Cent Capacity During 1927

Production Increases 5 Per Cent Over Previous Year—
Sales Increase 6 Per Cent, but Price Per Barrel Decreases
9 Cents—U. S. Bureau of Mines Releases 1927 Statistics

STATISTICS relating to the portland cement industry in 1927 compiled by the Bureau of Mines, Department of Commerce, from the final returns of the producers for the year, confirm the estimates published by the Bureau early in January.

Production of portland cement in 1927—173,206,513 barrels—was the largest quantity manufactured thus far in any year, exceeding that in 1926, the next highest year in production, by 5 per cent.

Shipments of portland cement from mills in 1927 amounted to 171,864,728 barrels, valued at \$278,854,647, an increase of 6 per cent in quantity and of 0.3 per cent in gross value. The average factory price per barrel in bulk in 1927 was \$1.62, a decrease of 9 cents per barrel as compared with 1926.

Stocks at the mills also increased, reaching a total of 22,081,972 barrels on December 31, 1927, the greatest at the end of any year during which official records of stocks have been kept. They were about 6 per cent higher than at the end of 1926.

The commercial capacity for production of finished portland cement of the 153 plants active at the end of 1927, and of two plants idle in 1927 but producing within the two previous years, according to manufacturers' reports supplemented by a few estimates, was 227,080,000 barrels. This total includes besides increased capacity due to extensions and improvements at old plants approximately 13,863,000 barrels capacity for finished portland cement of 14 new plants that began operating during the year and are located as follows: one each in Alabama, California, Colorado, Florida, Iowa, Louisiana, Tennessee, and Texas, and two each in New York, Pennsylvania, and West Virginia. The total production for the year 1927 was 76.3 per cent of the indicated capacity at the close of the year. The corresponding figure for 1925 from the producers' reports was 83.5 per cent. The figure for 1926 based on estimates of capacity made by the Bureau of Mines for the year was 76.4 per cent.

PORTLAND CEMENT MANUFACTURING CAPACITY OF THE UNITED STATES, BY COMMERCIAL DISTRICTS, 1927*

District	Estimated capacity (barrels)	Percentage of capacity utilized
Eastern Pennsylvania, New Jersey, Maryland	47,074,000	90.7
New York	15,760,000	68.4
Ohio, Western Pennsylvania, West Virginia	23,260,000	74.5
Michigan	18,591,000	75.1
Wisconsin, Illinois, Indiana and Kentucky	26,161,000	84.2
Virginia, Tennessee, Alabama, Georgia, Florida and Louisiana	21,846,000	73.3
Eastern Missouri, Iowa, Minnesota, So. Dak.	20,357,000	70.5
Western Missouri, Nebraska, Kansas, Okla.	14,013,000	72.0
Texas	7,230,000	78.2
Colorado, Montana and Utah	5,592,000	39.0
California	21,813,000	66.8
Oregon and Washington	5,383,000	65.7
	227,080,000	76.3

*Subject to revision.

SHIPMENTS OF DOMESTIC PORTLAND CEMENT FROM MILLS INTO STATES AND PER CAPITA, 1926 AND 1927, IN BARRELS*

State	1926		1927	
	Total	Per capita*	Total	Per capita*
Alabama	1,981,011	0.78	2,264,576	0.89
Arizona†	426,261	0.96	562,460	1.23
Arkansas†	769,808	0.40	855,051	0.44
California	12,691,277	2.94	13,128,911	2.96
Colorado	1,138,301	1.07	1,002,396	0.93
Connecticut†	1,856,786	1.16	2,061,892	1.26
Delaware†	360,193	1.50	342,905	1.41
District of Columbia†	907,342	1.72	981,732	1.82
Florida‡	4,373,917	3.32	2,482,725	1.82
Georgia	1,831,276	0.58	1,904,685	0.60
Idaho†	443,737	0.85	311,226	0.58
Illinois	14,066,500	1.95	14,832,550	2.03
Indiana	5,174,533	1.66	5,738,557	1.82
Iowa	2,826,839	1.17	3,708,471	1.53
Kansas	2,286,661	1.26	2,432,055	1.33
Kentucky	1,659,087	0.66	1,953,629	0.77
Louisiana‡	1,187,453	0.62	1,490,560	0.77
Maine†	548,155	0.69	505,952	0.64
Maryland	2,318,564	1.47	2,651,700	1.66
Massachusetts†	2,982,987	0.71	2,820,132	0.66
Michigan	10,784,049	2.45	11,576,188	2.58
Minnesota	3,572,711	1.35	3,380,002	1.26
Mississippi†	804,351	0.45	980,791	0.55
Missouri	5,201,961	1.49	4,207,151	1.20
Montana	257,741	0.37	307,968	0.43
Nebraska	1,554,967	1.12	1,360,032	0.97
Nevada†	94,644	1.22	87,276	1.13
New Hampshire†	438,350	0.97	459,706	1.01
New Jersey	7,116,109	1.93	8,419,323	2.25
New Mexico†	192,718	0.50	278,528	0.71
New York	20,224,702	1.79	23,002,585	2.01
North Carolina†	3,731,959	1.31	3,213,314	1.11
North Dakota†	402,546	0.63	392,730	0.61
Ohio	9,683,538	1.47	10,342,424	1.54
Oklahoma	2,342,201	1.00	3,119,565	1.31
Oregon	1,318,252	1.50	1,399,167	1.57
Pennsylvania	13,839,552	1.44	13,837,359	1.42
Rhode Island†	634,626	0.92	700,851	1.00
South Carolina†	638,972	0.35	985,874	0.53
South Dakota	423,831	0.62	409,820	0.59
Tennessee	1,933,409	0.78	2,262,697	0.91
Texas	4,877,987	0.92	5,437,907	1.01
Utah	461,338	0.90	428,469	0.82
Vermont†	271,615	0.77	393,294	1.12
Virginia	1,733,734	0.69	1,799,062	0.71
Washington	2,021,986	1.31	2,574,293	1.65
West Virginia	1,679,574	1.01	1,561,978	0.92
Wisconsin	4,621,975	1.60	5,553,176	1.90
Wyoming†	188,590	0.80	181,103	0.75
Unspecified	60,031	—	51,818	—
	160,939,707	1.37	170,736,616	1.44

Exports reported by manu-
facturers but not includ-
ed above§

Total shipped from ce-
ment plants

*Per capita figures based on estimate of population made by the Bureau of the Census.

†Non-cement-producing state.

‡Florida began producing September, shipping October, 1927; Louisiana began producing June, shipping July, 1927.

§Includes shipments to Alaska, Hawaii and Porto Rico.

PORTLAND CEMENT PRODUCED, SHIPPED, AND IN STOCK IN THE UNITED STATES, 1926 AND 1927, BY DISTRICTS

District	Production				Shipments				Stock (Dec. 31)			
	Active plants		Barrels		Increase or decrease 1927 (per cent)		Barrels		Average factory value per barrel		Increase or decrease in quantity 1927 (per cent)	
	1926	1927	1926	1927	1926	Value	1927	Value	1926	1927	1926 (revised)	1927
E. Pa., N. J. & Md.	23	24	42,139,204	42,687,200	+ 1	40,635,514	\$ 69,581,973	41,656,489	\$ 64,614,336	1.71	1.55	+ 3
New York	9	11	8,795,768	10,775,375	+23	8,535,862	14,864,066	10,531,092	16,380,090	1.74	1.56	+23
Ohio, W. Pa. & W. Va.	15	18	15,913,500	17,339,199	+ 9	15,758,822	26,336,705	17,202,341	27,638,726	1.67	1.61	+ 9
Michigan	16	15	12,037,400	13,965,241	+16	11,959,447	19,499,788	13,708,259	20,858,202	1.63	1.52	+15
Wis., Ill., Ind. and Ky.	11	11	21,350,107	22,022,150	+ 3	21,876,629	36,267,413	22,394,739	36,274,654	1.66	1.62	+ 2
Va., Tenn., Ala., Ga., Fla.* & La.†	14	18	15,307,606	16,016,154	+ 5	14,963,262	24,860,207	15,530,338	23,668,315	1.66	1.52	+ 4
E. Mo., Iowa, Minn., S. D.	10	11	14,138,619	14,358,201	+ 2	14,026,247	23,754,460	14,566,818	23,325,158	1.69	1.60	+ 4
W. Mo., Neb., Kan., Okla.	11	11	10,277,391	10,092,888	- 2	10,158,484	16,068,802	10,250,532	16,809,793	1.58	1.64	+ 1
Texas	6	7	5,007,374	5,655,835	+13	5,042,359	9,522,701	5,692,350	10,232,908	1.89	1.80	+13
Colo., Mont. & Utah	7	8	2,523,509	2,179,241	-14	2,457,303	5,167,446	2,293,514	4,692,136	2.10	2.05	- 7
California	11	12	13,842,483	14,580,654	+ 5	13,660,078	25,299,245	14,433,153	26,623,396	1.85	1.84	+ 6
Ore. & Wash.	7	7	3,197,209	3,534,375	+11	3,113,083	6,742,667	3,605,103	7,736,933	2.17	2.15	+16
	140	153	164,530,170	173,206,513	+ 5	162,187,090	\$277,965,473	171,864,728	\$278,854,647	\$1.71	\$1.62	+ 6

*Began producing in September, shipping in October, 1927. †Louisiana began producing in June, shipping in July, 1927.

Explosives Transportation Report Shows 100 Per Cent Safety in 1927

The annual report of the Chief Inspector of the Bureau for the Safe Transportation of Explosives and Other Dangerous Articles for the year 1927, recently published, shows that transportation was furnished for all explosives moved in the United States and Canada, including a total of about 500,000,000 pounds of dangerous explosives, without any loss of life or injury to life and with a total money loss of only \$45.

All shipments of black powder and high explosives were carried from shipping points to destination and removed from railroad property without a single accident in transit or elsewhere. The property loss referred to resulted from four accidents to shipments of fireworks in transit.

In 1907, the first year of record, explosives were charged with seventy-nine accidents, fifty-two fatalities, eighty personal injuries, and a property loss of nearly a half million dollars. During the past three years there has not been a single fatality caused by carrying explosives on American or Canadian railroads. Unfortunately, nine personal injuries were reported in 1926, thus marring what would otherwise have been a perfect three-year record. The property loss for 1927 is unprecedented.

Cement Mills of France, Belgium and Luxemburg Negotiate Agreement

An agreement has been concluded between the French cement producers and those of Belgium and Luxemburg regulating the sale, exportation and importation of cement and cement products in those three countries.

The agreement is based on the principle of a limitation of the quantities of cement which may be exported by the Belgian and Luxemburg producers into France and the quantities the French producers may export into Belgium, Luxemburg and also Holland. There has been no apparent fixing of prices.

The amounts of the tonnages agreed upon have not been divulged. The rapid development of the industry in Belgium, particularly in the region of Tournai, since the war, was undoubtedly taken into consideration by the French producers, and the advisability of permitting this region priority in filling demands from the Dutch markets granted. This strengthens notably the economic en-

tente between Belgium and Holland as regards the Dutch markets.

This new accord between the cement producers of the three countries which produce the greater part of the cement in Europe will have considerable effect on the markets of the different countries. One immediate result will probably be the renouncing by cement interests of Luxemburg of their project to construct a large cement mill at Audun-le-Tiche, on French territory.

Since the announcement of this agreement activity among the cement interests has been particularly marked in Belgium. The following new incorporations have been announced within the past few days:

"Ferrociment," Marchienne-au-Pont, Belgium; capital 6,000,000 francs; backed by the big steel and iron interests; will produce all forms of cement.

"Auxiliaire des Ciments," Brussels; capital 10,000,000 francs; backed by a combine of Belgian cement mills; interested in everything connected with cement.

A new Belgian corporation is being formed to acquire control of several cement mills in eastern Europe. It will be capitalized at 40,000,00 francs.

Newaygo Plans Another Mill in Michigan

With an eye toward the future, the Newaygo Portland Cement Company, Newaygo, Mich., is planning to build a large cement manufacturing plant at Charlevoix, Mich.

Stone fields there were acquired eight years ago. The site is well adapted to shipments by water, which will be made in boats owned by the company.

J. B. Johns, in making the announcement, said: "Building costs are now lower than at any time in the last fifteen years, and therefore we feel it is the logical time to build the Charlevoix plant, which has been planned for some time. There is no intention of moving the machinery of the Newaygo mill and no immediate prospect of its being closed."

In referring to the regular dividends paid by the Newaygo plant, Mr. Johns pointed out that this has been done in the face of unusual productive costs in the way of freight, etc., while competition in the industry is keener than ever before, with many large new mills in the area formerly served by but a few. "In building a plant at Charlevoix," he said, "we are simply taking advantage of present low building costs to safeguard ourselves by strengthening our position in the industry from a manufacturing viewpoint."

MEN and MILLS

Notes from the Field

Secretary J. E. Zahn Heads Rotarians

J. E. Zahn, secretary of the United States Portland Cement Company, Denver, Colorado, has been elected president of the Denver Rotary Club.

San Juan Plant Resumes Operation

The plant of the Old Mission Portland Cement Company at San Juan, Calif., reopened during June, improvement work being undertaken at the same time. One of the principal activities in that direction was the extension of the quarry railroad for about three miles, to a supply of limestone sufficient to last 18 to 20 years.

MacBride Vice-President and General Manager of Lone Star Cement Co.

D. S. MacBride has been elected vice-president and manager of the Lone Star Cement Company of Pennsylvania, located at Philadelphia. Mr. MacBride has for the past three years been vice-president of the Indiana Portland Cement Company, Indianapolis, which position he retains. His headquarters, however, in the future will be at Philadelphia.

Carolina Plant

Final contracts for the \$3,000,000 cement plant at New Bern, N. C., have been signed in New York City.

Monolith Strikes Trouble in Valuation of Railroad Property

Land owners asking unreasonable prices or refusing to sell are said to be retarding the progress in the construction of the Laramie Valley Railroad to the Monolith Portland Midwest Company's quarries. The distance involved is twelve miles.

The case has been taken to court but the outcome is as yet unknown.

Ideal Oil Well Continues to Gush

Ideal Cement Company's surprise oil well near its Ada, Oklahoma, plant continues to gush and all oil is being sold. The well was happened upon when gas was being sought several months ago. A second well has since been drilled and it is yielding more than 5,500,000 cu. ft. of wet gas daily and spraying about 100 bbls. of oil.

By drilling deeper, it is said, Ideal could secure another oil well, but the gas is preferred for the operation of the cement plant. Additional gas wells are to be drilled.

King Dedicates Foremost Spanish Cement Plant

The recent dedication of the Villaluenga, Spain, plant of the Compania General de Asfaltos y Portland Asland was an occasion worthy of the presence of the king and the illustrations show Alfonso XIII, king of Spain, accompanied by the Spanish dictator, General Primo de Rivera. It was an impressive ceremony.

The king is distinguished by the cane he carries. Beside him in the lower photograph is Don Juan Ferrer y Vidal, general

manager of the new plant.

The company is said to be the largest and most successful manufacturer in Spain, owning and controlling six plants. Its first plant was built in 1901 about 40 miles from Barcelona. The Villaluenga plant is the latest, and, most modern, with a daily capacity of 1500 barrels. It is equipped with Edge Moor waste heat boilers. These and other equipment were supplied by the Allis-Chalmers Company.



Monolith Midwest Begins Concrete Campaign

Education of the public to appreciate the value of concrete construction is being undertaken by the Monolith Portland Midwest Company in Denver and the vicinity. H. C. Gardner, director of sales for the company, arrived there on May 23rd to take charge of the campaign.

The promotional work is designed primarily for the furtherance of stock sales.

Cement Man Tells Engineers of Chemical Problems

Problems in the manufacture of cement and progress in that direction were the subject of a talk given by Hubert Woods of the Riverside Portland Cement Company at a recent meeting of the Pasadena (Calif.) Engineering Society.

Mr. Woods is a Riverside chemical engineer.

Plants Hold Enthusiastic Safety Meetings

Enthusiastic individual plant safety gatherings supplemented regional meetings held throughout the country during May and June. The plant safety council of the Lawrence Portland Cement Company conducted a safety mass meeting at a local theater on May 29th, for employees and their families. The speaker of the evening was H. B. Harmer, safety engineer of the Philadelphia Electric Company. These meetings have been an annual event for several years.

Nearly all of the 300 employees and their families attended the annual spring accident prevention and safety first meeting of the Giant Portland Cement Company plant at Egypt, Pa. O. D. Harvard, general superintendent of the plant, gave the address of welcome and told of the company's interest in safety work. Other speakers were W. W. Ritter, safety engineer of the State Workmen's Insurance Fund; P. J. Quigley, chief of quarry and mine inspection of the Department of Industry. A minstrel performance followed.

At the Coplay Cement Manufacturing Company plant are two poles bearing an individual pennant for each department. Should an accident occur, the department affected will have its flag lowered. An inspirational safety meeting was held on May 31st, at which members of the safety committee, as follows, talked: D. J. Uhle, operating manager; Jos. V. Durnin, assistant operating manager; J. A. Vandergrift, chairman; Charles L. Haas, committeeman, and W. F. Nagle, secretary.

To celebrate the record made by its Redwood City plant in not having a single lost-time accident during the year ending May 25th, the Pacific Portland Cement Company gave a luncheon for its employees on May 26th. Over 300 persons attended. Congratulatory talks were made by R. B. Henderson, president; J. H. Colton, vice-president in charge of operations; A. G. Lang, chief engineer, and W. G. French, head of the State Industrial Accident Commission. Mr. French was the principal speaker and told of the progress made in safeguarding the lives of workmen during the past several years. Harold C. Power, superintendent of the local plant, acted as chairman of the luncheon.

Records for the first quarter of 1928 show that 69 mills and quarries completed the term without a lost-time accident or fatality. This is an increase of 29 mills over the 1927 record. As a reward for their caution these mills automatically become members of the Portland Cement Association's Trophy Club, which presents trophies to those going the entire year without accident.

From another angle, the first three months of 1928 recorded 292 lost-time accidents and eight fatalities in the industry,

comparing favorably with 1927, when there were 395 lost-time accidents and nine fatalities. This new record amounts to a decrease of 26 per cent, although there were 11 per cent more mills reporting in 1928.

A safety rally attended by employees, their families and the general public was conducted by Superior Portland Cement, Inc., at Concrete, Wash., on June 1st. A short talk by C. N. Reitze, vice-president and general manager of the company, outlining the purposes and plans of the June campaign opened the rally. Martin Flyzik, state supervisor of safety, gave the next talk on "Safety First," followed by selections by a number of vocal soloists. The concluding talk of the evening was made by Forrest Beck, a superintendent of schools, on "The Psychology of Safety." Community singing closed the rally.

Plant Entertains County and State Officials

Four hundred fifty county and state officials, members of the Association of County Commissioners of the State of Georgia, were the guests of the Plant No. 2 of the Pennsylvania-Dixie Cement Corporation, at Clinchfield, Ga., on May 17th. Supt. Chas. S. Vance and District Sales Manager John M. Wilkerson acted as hosts. Barbecue refreshments were served.

After being escorted through the plant and quarry, the guests were presented with souvenirs in the form of miniature barrels of cement by "Miss Clinchfield."

Death Takes Chas. Saeger, Former Coplay Manager

The death of Charles M. Saeger, former manager of the Coplay Cement Company, took place at Allentown, Pa., on June 2nd. He was 71 years of age. Charles M. Schwab attended the services at the home.

Mr. Saeger was born in Allentown. Following the completion of a course in civil engineering, he was employed for a time by the Carbon Iron and Pipe Company, Parryville, Pa. He remained with that concern until 1885 when he entered the services of the Coplay Cement Company, headed by his father at that time. He became general manager of the plant and was engaged in that capacity until ten years ago when he retired. He was also a director of the company.

Since taking up his residence in West Bowmans a number of years ago, Mr. Saeger devoted his interests to the civic improvement of the community. The most recent activity in which he was interested was the erection of a community house at West Bowmans, Pa., his residence until death occurred. Mr. Saeger designed and assisted in the supervision of the construction of the building.

New Maine Plant Secures Wide Publicity

Those Maine residents who are even moderate newspaper readers should before long know the workings of a cement plant as well as a cement man himself if the new Lawrence Portland Cement Company plant at Thomaston, Maine, continues to receive the volume of newspaper publicity it has in the past few weeks. A recent issue of one Rockland, Maine, paper contained 7 pages of information, accompanied by illustrations of the plant and its personnel.

Eastern Pennsylvania Cement Baseball League Organized

Ten baseball teams, comprising the Eastern Pennsylvania Cement League, were organized at a meeting held at Allentown, Pennsylvania, on June 14th. At the same time a petition signed by over a hundred employees of cement companies opposed to having players other than cement plant men in the league was voted upon and passed.

May Develop Tract Near Stockton, Calif.

Options are being secured by representatives of Eastern interests on a tract of land of 350 to 400 acres at Volcano, Amador County, Calif. Volcano is some distance north of Stockton. Surveys and surface tests have been made. Drilling done recently indicates an extensive supply of raw material.

Plans are now being made for the extension of a broad gauge railroad line and contracts are pending for diamond drilling.

Arkansas Portland Surveying for Transportation Routes

Construction is about to begin on the 3,000 bbl. per day plant for the Arkansas Portland Cement Company in Howard County, east of White Cliffs, Arkansas. Two surveys, for railroad and highway facilities, are being made.

This represents the first unit of the 6,000 bbl. capacity planned.

The company will build a four-mile railway from the station of Schaal on the Graysonia, Nashville and Ashdown Railroad. The highway, which the firm is also constructing, will connect the plant with the Saratoga-Mineral Springs highway.

Giant Dividend

The Giant Portland Cement Company has declared its regular semi-annual 3½ per cent preferred dividend, payable June 15th on stock of record June 4th.

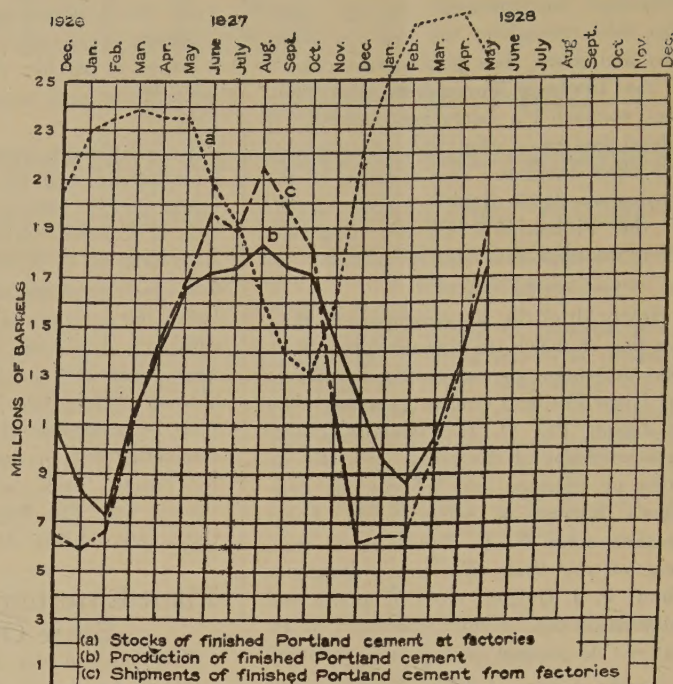
Cement Statistics for May

THE portland cement industry in May, 1928, produced 17,280,000 barrels, shipped 18,986,000 barrels, from the mills, and had in stock at the end of the month 25,921,000 barrels, according to the United States Bureau of Mines, Department of Commerce. The production of portland cement in May, 1928, showed an increase of 3.5 per cent and shipments an increase of 12.6 per cent, as compared with May, 1927. Portland cement stocks at the mills were 10.3 per cent higher than a year ago. The total production from January to May, 1928, inclusive, amounts to 59,536,000 barrels compared with 57,834,000 barrels in the same period of 1927, and the total shipments from January to May, 1928, inclusive, amount to 55,532,000 barrels as compared with 55,014,000 barrels in the same period of 1927.

In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 157 plants at the close of May, 1928, and of 146 plants at the close of May, 1927.

Relation of Production to Capacity

	May		April	March	February
	1928	1927	1928	1928	1928
	Per cent	Per cent	Per cent	Per cent	Per cent
The month	86.6	88.9	70.0	51.7	47.5
The 12 months ended	73.9	75.5	74.0	74.6	75.1



Production, Shipments, and Stocks of Finished Portland Cement, by Districts, in May, 1927 and 1928, and Stocks in April, 1928, in Barrels

District	—Production—		—Shipments—		Stocks at end of month		Stocks at end of April, 1928*
	1927	May—1928	1927	May—1928	1927	1928	
Eastern Pennsylvania, New Jersey, Md.	4,040,000	3,814,000	4,139,000	4,200,000	5,048,000	6,102,000	6,488,000
New York and Maine†	1,033,000	1,291,000	961,000	1,239,000	1,695,000	1,899,000	1,847,000
Ohio, Western Penn., and West Virginia	1,558,000	1,803,000	1,538,000	1,898,000	3,400,000	3,482,000	3,577,000
Michigan	1,558,000	1,280,000	1,431,000	1,507,000	2,195,000	2,240,000	2,467,000
Wisconsin, Illinois, Indiana and Kentucky	2,189,000	2,374,000	2,336,000	2,793,000	3,131,000	3,011,000	3,429,000
Virginia, Tennessee, Ala., Ga., and La.	1,456,000	1,337,000	1,453,000	1,500,000	1,146,000	1,876,000	2,040,000
Eastern Missouri, Ia., Minn., and So. Dak.	1,440,000	1,766,000	1,383,000	2,043,000	3,289,000	3,524,000	3,901,000
West. Missouri, Nebraska, Kan., and Okla.	1,037,000	1,188,000	1,070,000	1,181,000	1,725,000	1,573,000	1,566,000
Texas	462,000	531,000	573,000	610,000	314,000	389,000	468,000
Colorado, Montana, and Utah	246,000	311,000	229,000	267,000	515,000	510,000	465,000
California	1,364,000	1,175,000	1,423,000	1,235,000	573,000	869,000	929,000
Oregon and Washington	318,000	410,000	329,000	413,000	472,000	446,000	450,000
	16,701,000	17,280,000	16,865,000	18,986,000	23,503,000	25,921,000	27,627,000

Production, Shipments, and Stocks of Finished Portland Cement, by Months, in 1927 and 1928, in Barrels

Month	—Production—		—Shipments—		Stocks at end of month	
	1927	1928	1927	1928	1927	1928
January	8,258,000	9,768,000	5,968,000	6,541,000	22,914,000	25,116,000
February	7,377,000	8,797,000	6,731,000	6,563,000	23,563,000	27,349,000
March	11,450,000	10,223,000	11,100,000	10,135,000	23,922,000	27,445,000
April	14,048,000	13,468,000	14,350,000	13,307,000	23,654,000	*27,627,000
May	16,701,000	17,280,000	16,865,000	18,986,000	23,503,000	25,921,000
June	17,224,000		19,761,000		20,972,000	
July	17,408,000		18,984,000		19,397,000	
August	18,315,000		21,411,000		16,292,000	
September	17,505,000		19,828,000		13,996,000	
October	17,174,000		18,105,000		13,141,000	
November	14,449,000		11,619,000		16,022,000	
December	11,999,000		6,200,000		*22,082,000	
	171,908,000		170,922,000			

*Revised. †Maine began producing April, 1928, and shipping May, 1928.

MODERN STEAM GENERATION

STEAM GENERATION is a combined process of heat liberation and heat absorption. The fuel burning equipment, the furnace and the steam boilers must be co-ordinated in one unified design—to assure efficient and dependable performance.

There is no sharp dividing line between the responsibilities of the stoker or burner manufacturer, the furnace builder and the boiler maker. The performance of individual elements is secondary to the performance of the combination—as a unit.

The ultimate goal sought is to produce steam at the minimum cost, giving proper consideration to all the factors which enter into the problem of steam generation.

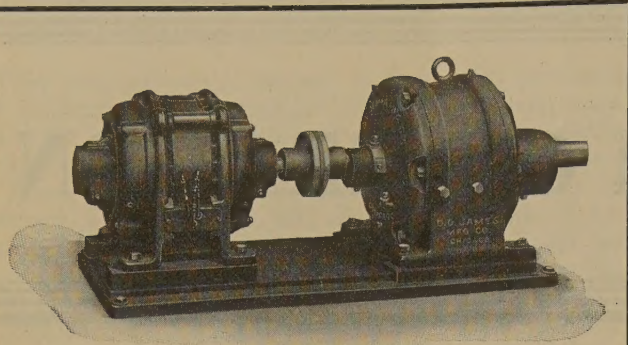
This company offers—one contract, one responsibility—for complete fuel burning and steam generating installations. Typical examples of modern steam generating units installed by this company are shown on the following pages.

Combustion Engineering Corporation

International Combustion Building

200 Madison Avenue, New York

(Continued from Page 114)



JAMES Does It Better

Of course James does it better—why not—look at the ordinary spur gear speed reducers—gears thrown into a housing—no internal stationary gear—bearings subjected to radial loads by tooth thrusts and separation strains—reversal of power at every step developing strong torque—did we say speed reducers—forgive it please.

But we won't make the same mistake this time—we'll say speed reducer and mean it—because we're talking about a D. O. James—three gears contacting with a stationary internal gear—planetary construction—planetary revolving of gears—one more step of reduction on each gear set than can be obtained by any other reducer—intermediate gears balanced in action by forces of the driving pinion and stationary ring gear—a **condition producing balanced thrust**—a real speed reducer we're talking about isn't it—a D. O. James.

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when nearly everyone belonged to some trade or other. You might take, for instance, the wagon maker. The wagon maker of the early days, now almost passed into history, oftentimes hewed the timber, selected the hickory for the whippletree, sawed and cured the lumber, fashioned the spokes, put in the hubs and the feloe, hammered out the steel for the tires with his forge, and finally assembled all parts into a finished product; then isolated it in the paint shop, where the finishing was done and his name in large handsome letters stenciled on the wagon box.

"In a business such as that very little organization and no rules or red tape are required. Such a man can do just as he pleases; he can start work when he will, he can stop as he desires. But on the day that he takes in a partner or a workman as an employe, some understanding has to be had as to division of duties.

"To carry this thought further to the large establishments or manufacturers, a need for regulations, for rules, for what is commonly called regulatory red tape, can be seen. It is necessary for one man to be assigned to the bookkeeping, another to the manufacture, someone else to the selling, someone else to the financing. Each of these great divisions or operations are subdivided again so that each workman has his separate and individual task.

"A manufacturing organization today might be compared to a gigantic athletic team; a football team, for example, cannot start to play without one or more of the important members of the team. This is allied to business, where various employes who man the different departments must be on hand at the starting time and remain until closing time. The team is handicapped indeed when one or more of its star players are removed from the lineups. A manufacturing establishment is in the same position. When robbed of men who are assigned to special tasks, through accident, the entire organization becomes less efficient.

"To accomplish what you have done here is heralded throughout the country as one of the most sensational and outstanding achievements in modern industry, and I know the happiness which it has brought to your families and friends and the influence which this must be in this community. I know what pride is felt by the officers of your company, which is one of the most highly respected institutions in the world.

"As you progress from day to day in the manufacture of cement, you are doing something which is of lasting benefit to this community and to civilization. Cement is a product which is employed in wealth-creating improvements. Its use adds greatly to the pleasure, to the safety, and to the welfare of our present age. Cement has been called 'the Magic of Concrete' and has been described in many ways, some of which I have borrowed.

"The manufacture of cement—think of it!—millions of tons of stone, inert and useless, blasted from field and hillside; guided through scores of intricate processes and converted at last into impalpable powder—Cement—which is shipped to every nook and corner of this land; then, as if by a magician's wand, transformed again into stone and molded and fashioned to meet the needs of the architect, builder, and the engineer; to make safe and sanitary the builder and the engineer. Cement is the material responsible, and you who are making cement are doing things worth while.

"I am here as a fellow employe of the cement industry on behalf of the officers and members of the Portland Cement Association. I congratulate you and extend best wishes for a perpetual continuation of this enviable record."